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TOOL & DIE JOURNAL

TOOLING AND PRODUCTION

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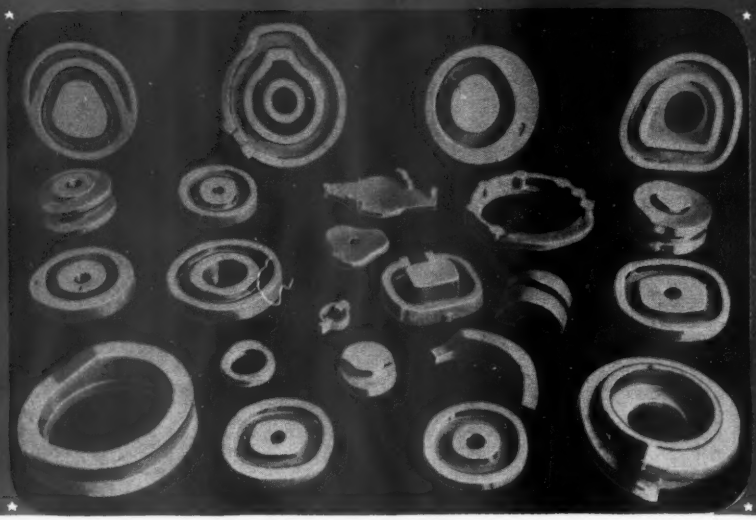

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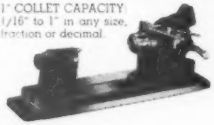
Collet Index Fixtures with Threaded Nose Spindle are fast in operation and hold work accurately

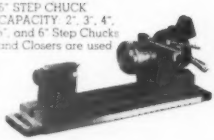
In addition to taking standard collets, this fixture takes step chucks and jaw chucks to cover a wide range of applications. It will eliminate the necessity of your tool room making many specially designed fixtures. Thus, your engineers and tool-makers will have more time for other work.

A preselector arrangement provides the selection of separate indexing of any number divisible into 20 or 24. The collet closer lever has a 100 to 1 leverage for quick opening and closing of collets and step chucks. Write for bulletin.

1" COLLET CAPACITY 1/16" to 1" in any size, fraction or decimal.



6" STEP CHUCK CAPACITY 2", 3", 4", 5", and 6" Step Chucks and Closers are used.



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increase production of your lathes and milling machines

A Hardinge-Sjogren Nose Type Speed Collet Chuck enables you to get full value from your toolroom lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Production is increased as the operator is always in front of his work. Available in three sizes for 1", 1 3/8", or 1 3/4" collet capacity. Write for complete bulletin.

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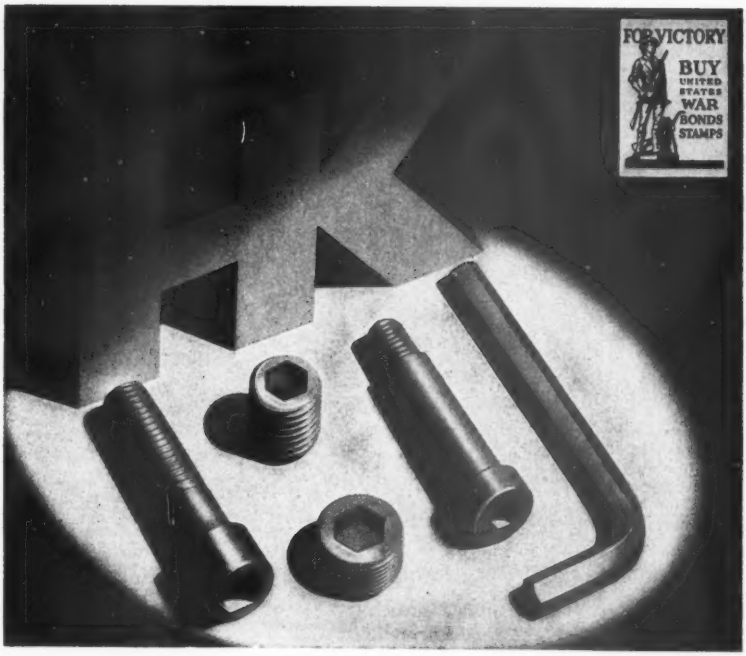

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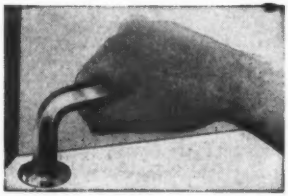

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It's the better fastening method. Designs are more compact, members to be fastened are reduced in size, fastening locations closer to corners and edges, weight and space saved. Production lines move with more speed and efficiency. Records prove Holo-Krome FIBRO FORGED SOCKET SCREWS — the Completely Cold Forged Screws — to be the better fastening method . . . Your Industrial Supplies Distributor has the facts — ask him!

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A few simple rules to conserve carbide tools

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KEEP EM SHAR
FIRST AID
Watch your carbide tools! Don't let them
they break! Change them for resharpen
reasonable number of pieces have been
This will give you more pieces per tool. S
sharp tools give better accuracy and en
FIRTH-STERLING STEEL COM

The conservation of carbide tools through proper handling and correct usage is essential not only in war time but at any time for best production results and low operating costs.

These Firthite field service posters will help remind your plant operators in simple, easy-to-take, understandable manner, of the right way to make carbide tools do their utmost.

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I BEST-TA ABY 'EM!
SET 'EM CORRECTLY
NICE SETTIN'! THANK YOU SIR!
Carbide tools should have just enough n provide free cutting action, AND NO M Otherwise you weaken the cutting edge. cutting point exactly at the height of centerline of work.
FIRTH-STERLING STEEL COMPANY
WHEN GRINDING DON'T USE TOO MUCH FORCE
HELP!
h pressure against the abrasive ing carbide tools. If the wheel sure will remove metal at a uch pressure causes excessive may damage the tool!
ING STEEL COMPANY
RE TO USE ROPER OL!
FOR SHAPE
Carbide tools operate at higher speeds than any other metal-cutting tools. Carbide tools should always be larger than the steel or alloy tools they replace. Also, make sure they are of the correct style, shape, and grade.
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GRIND 'EM PROPERLY!
TOOL GRINDING RULES
Grinding rules for carbide tools are easily avail- able and should be followed carefully. The right wheel, running in the right direction, preserving correct angles are some of the things to n't guess—grind carbide
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Please send us without obligation on our part _____ sets of Firthite Field Service Posters which we wish to display in our plant shops.

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1 Speed up production and reduce costs with the Limitrol. The Limitrol Comparator Type Snap Gage checks errors involving pitch diameter, lead, taper, angle, out-of-roundness. It eliminates "feel" and reduces scrap. Write for Folder 44-L.

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5 Gages of Nawlide, a specially processed Woodworth alloy, are outwearing ordinary steel gages many times with no sacrifice in toughness.

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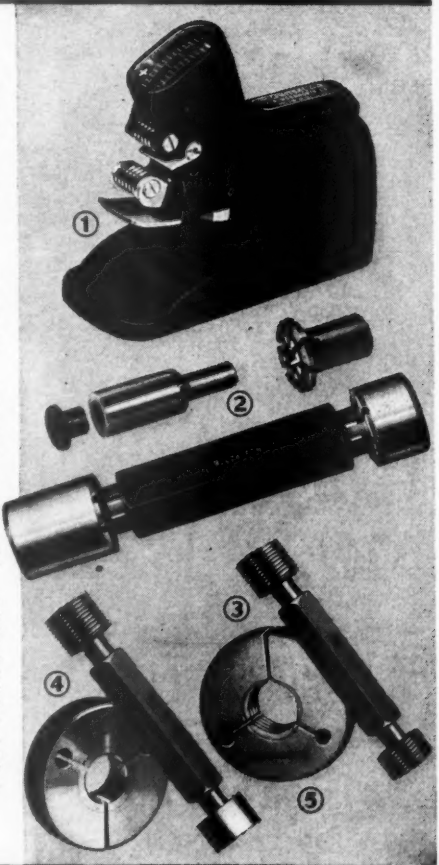

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There was a time, not so many years ago, when the words "Made by Hand" were synonymous with highest quality. In some things this still holds true.

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Tool Room Supt.

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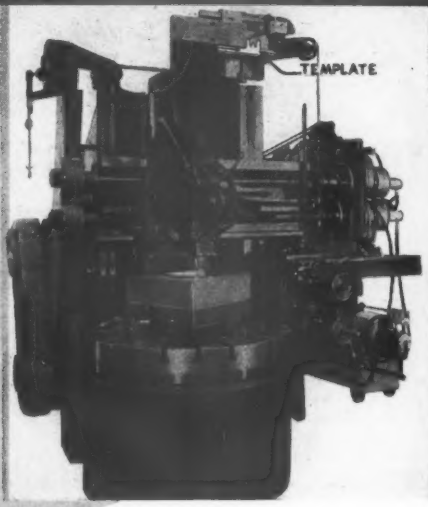
HIGH SPEED STEELS · DIE STEELS · TOOL STEELS · STAINLESS · LATROBE RED ARROW for metal-cutting tools

LATROBE ELECTRIC STEEL COMPANY · LATROBE, PENNSYLVANIA

Bullard lathe, controlled by Duplimatic, machining a forging die. Template shows contour of operation.



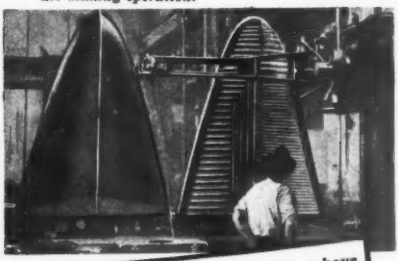
CONVERT

Your present machine tools to DIE SINKING PROFILING Automatic CYCLING for peacetime contracts by using

Duplimatic

THE AUTOMATIC MACHINE TOOL CONTROL

Standard boring mill controlled by Duplimatic on automotive die making operation.



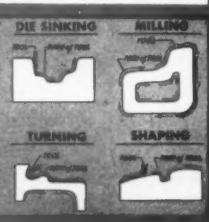
DUPLIMATIC will help you get the jump on competition by quickly converting standard machine tools, within one or two days, into completely automatic die sinkers, precision profilers or contour machines, to produce work of unerring accuracy faster and with *unskilled* help.

DUPLIMATIC *will not interfere in any way with the standard operation of the machine tool,* changing from *automatic to manual* operation at the push of a button.

DUPLIMATIC controls one, two or three feeds, depending upon the work, limited in size only by the capacity of the tools.

WRITE for information! If you have any profiling or die sinking problems, let us submit a proposal. Send sketch or sample for specific details.

Sketches of some types of work handled by Duplimatics



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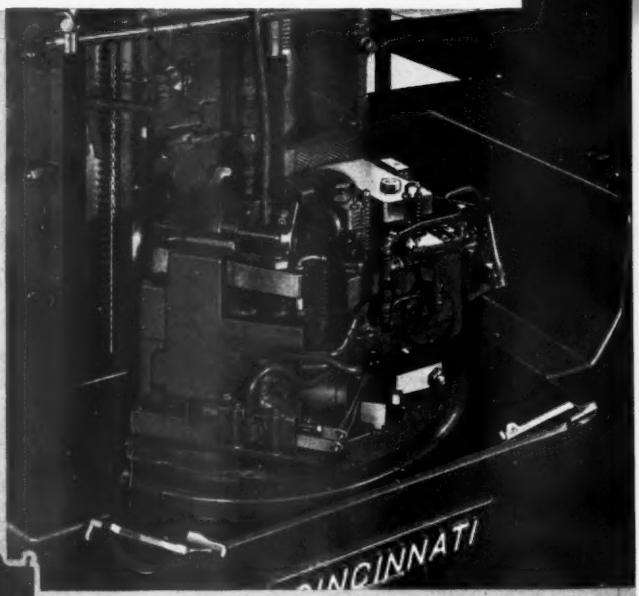
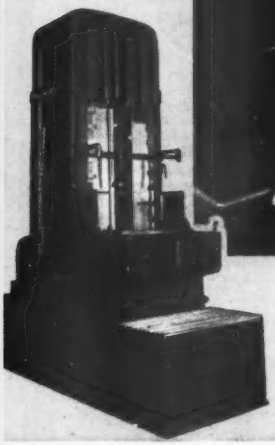
HYDRAULIC POWER FROM MACHINE
OPERATES FIXTURES
RESULTING IN SEVERAL ADVANTAGES

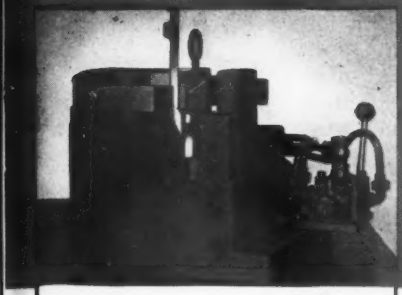
CINCINNATI No. 5-42 Duplex Vertical Hydro-Broach Machine. Brief description of these productive and dependable machines may be found in Sweet's catalog file. Complete data may be obtained by writing for specification catalog, M-894-2.

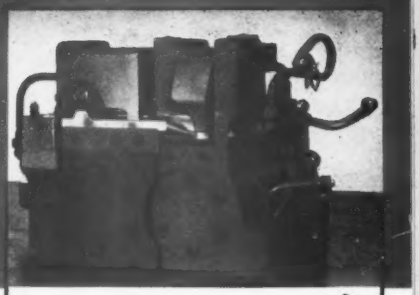




CINCINNATI No. 5-54 Duplex Vertical Hydro-Broach Machine, tooled up for two broaching operations on operating rod handle: right side, finger bar tip, and spot on tube section (right-hand ram) and 9/16" radius and form (left-hand ram).

THE CINCINNATI MILLING MACHINE CO.
TOOL ROOM AND MANUFACTURING MILLING MACHINES · SURFACE BROACHING MACHINES · CUTTER SHARPENING





Left-hand fixture and drawing of the part, showing surfaces broached.

Right-hand fixture and drawing of the part, showing surfaces broached.

Hydraulically powered machines like the CINCINNATI Hydro-Broach have a potential source of power which may be tapped for external work in conjunction with operation of the machine Taking advantage of this characteristic, CINCINNATI Engineers developed the hydraulic fixtures shown on the No 5-54 Duplex Hydro-Broach (left), for two broaching operations on rifle parts.

This type of equipment, the very latest for modern production methods, offers these important advantages: (1) *Easy to clamp and unclamp;* hydraulic power does the work. (2) *Safer for the operator;* provision for interrupted clamping action. (3) *Safer for the machine and inserts;* operating cycle cannot start until part is fully and properly clamped. (4) *Power is available* from the machine. (5) *Minimum wear.*

This is another example of advanced thinking by CINCINNATI Application Engineers and their logical selection and development of fixtures, inserts, and machine to solve a specific machining problem. Let them work with you on your surface finishing operations. Send blueprint of part, along with material specifications, production requirements, sequence of operations, etc.

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Save production time with a

SHOPLIFTER

One man can handle heavy dies alone.

Not necessary to stop other machines to get help.

More production per day from your machines if a Shoplifter is handy to do the heavy job of moving dies from storage racks to the press. In these times when maximum production of machines is of vital importance, much time and labor can be saved if the operator can handle the heavy work of changing dies without calling for help from other operators.

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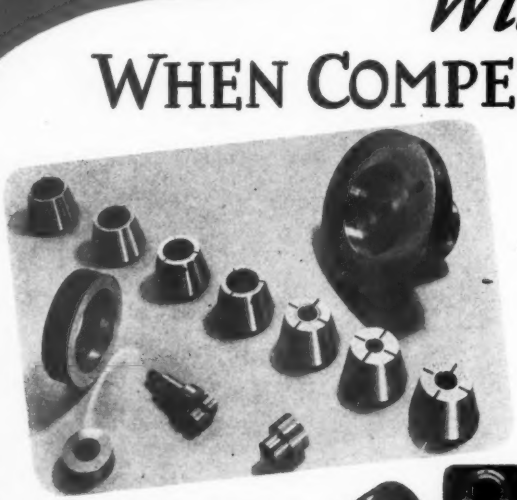

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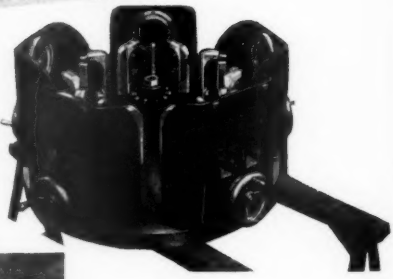

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Each passing day makes this question more pertinent.

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They will be confronted with better articles and keener competition.

Success will be closely related to speed and precision in manufacturing and low cost of production.

That requires sound tool designing and well engineered tool equipment which cannot be produced overnight or pushed to completion unduly.

All of which raises questions as to your situation in relation to postwar business.

Isn't it time RIGHT NOW to have a McKinney representative call to discuss how this specialized organization can aid in solving inevitable production problems?

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CLEVELAND

DESIGNERS and BUILDERS of PRECISION TOOLING
Since 1920
1673 ARABELLA ROAD

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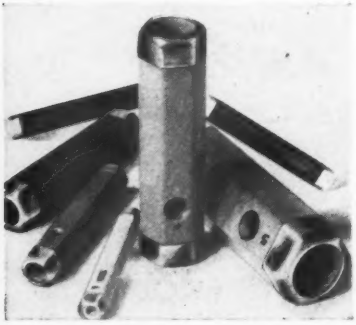
Made of durable plastic material, one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue . . . an advantage appreciated by women inspectors.



Federal Taperlock Plastic Gage Handles have proved very satisfactory for glass gages. Being so much lighter than metal handles, the danger of chipping and breaking is greatly reduced.

Plastic Handles insulate, protecting gages from bodily heat which might affect accuracy.

Easily marked for identification with the same tools used for marking metal handles. Available in SEVEN sizes—00 for small gages, 0, 1, 2, 3, 4 and 5. In FOUR colors — Red, Green, Yellow and Black.

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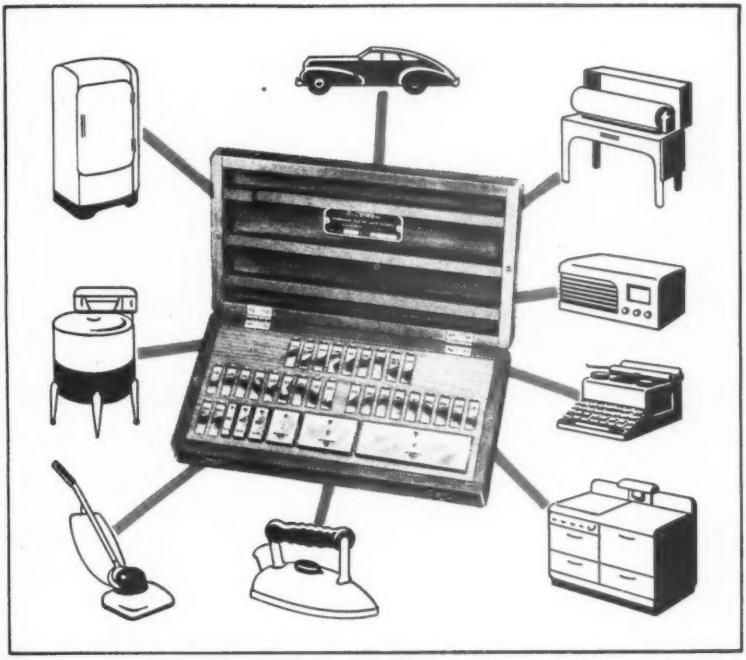
TOGGLE CLAMPS

To Speed Assembly, Machining Operations, Metal and Plastic Stamping.

For complete data, including tested pressure figures, send for the new Kwik Klamp Catalog.

DANLY MACHINE SPECIALTIES, INC.

2100 South 52nd Avenue — Chicago 50, Illinois



Be ready for Reconversion

1 *Place your order for new Ellstrom Chromium Plated Gage Blocks NOW*

2 *Send us your used Gage Blocks for a complete measurement check*

NOW IS THE TIME to place your order for new Ellstrom Chromium Plated Gage Blocks to speed the manufacture of your peace time products. START FRESH with the finest gage blocks that money can buy. They're Chromium Plated on the gaging surfaces to insure much longer wearing accuracies and they're UNCONDITIONALLY GUARANTEED. Offered individually or in complete sets in 3 classes.

TAKE ADVANTAGE of Dearborn Gage Company's inspection service for all makes of gage blocks. Send us your gages for a complete measurement check. You will receive a certificate of inspection stating the specified size of each block measured and the actual measurement or variation from normal size. Write today for details.

DEARBORN GAGE CO. 22035 BEECH STREET DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

WHY MAKE YOUR OWN BORING TOOLS?

★ BUY WAR BONDS ★

Why do things the hard way? It's not necessary today! Here! Take these boring tools.

RELIEVE YOURSELF OF A LOT OF BOTHER...

They're all ready to use. They are single point boring tools—designed to retain the same cutting angle despite repeated resharpenings.

This angle remains undisturbed because of the helical backed-off form of the tool. Consequently, resharpening is done on face only and clearance never disappears.

Here's a tool with high production efficiency because of its free cutting action and minimum down time.

STYLE A for boring through holes.

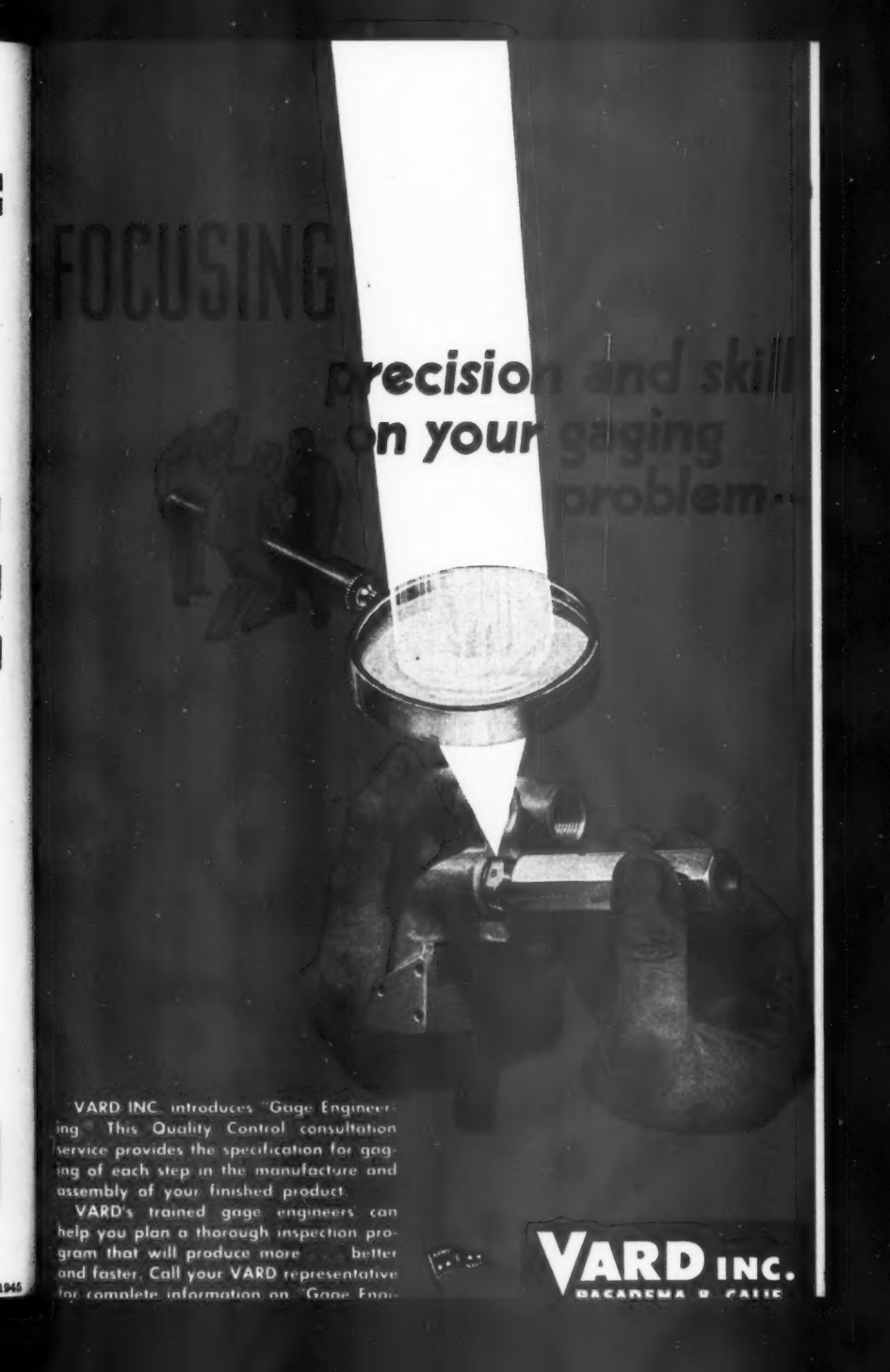
STYLE B for boring blind holes, bottoming and facing.

STYLE C for internal threading.

Send for catalog that shows all sizes and prices. Ask for No. E-1139 for super high speed tools and for No. E-398 for carbide tipped tools.

BOKUM TOOL CO.

14775 WILDEMERE AVE. · DETROIT 21, MICH.



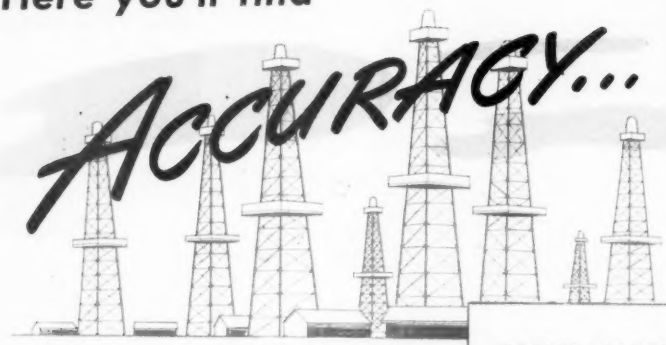
VARD INC. introduces "Gage Engineering." This Quality Control consultation service provides the specification for gaging of each step in the manufacture and assembly of your finished product.

VARD's trained gage engineers can help you plan a thorough inspection program that will produce more better and faster. Call your VARD representative for complete information on "Gage Engi-

VARD INC.
PASADENA 8, CALIF.

★ ★

Here you'll find ACCURAGY...

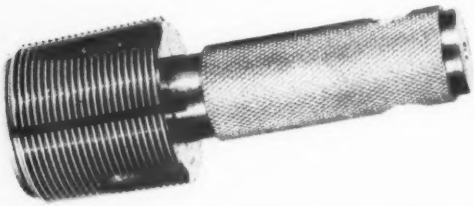


MASTER GAGES, checked by the National Bureau of Standards, maintained in all important petroleum areas and by pipe and tubing manufacturers, enable the industry to achieve an unusual degree of sustained accuracy. API standards of thread precision are considered the most exacting required in volume production, and the plan for maintaining these standards is without competition in excellence.

The privilege of imprinting the API monogram on gages, signifying conformance with American Petroleum Institute standards of precision, is not freely or loosely granted.

The Pipe Machinery Company has proudly enjoyed that permission for many years.

You can always rely on the sustained accuracy and perfection of finish of any gage that carries the PM Diamond Emblem.



Special Gages, made to your specifications, will be quoted on request. Large stocks of standard Plug, Ring and Thread Gages are ready for immediate shipment.

ARMY NAVY

The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • MULTIPLE THREAD MILLING CUTTERS • SPECIAL TOOLS

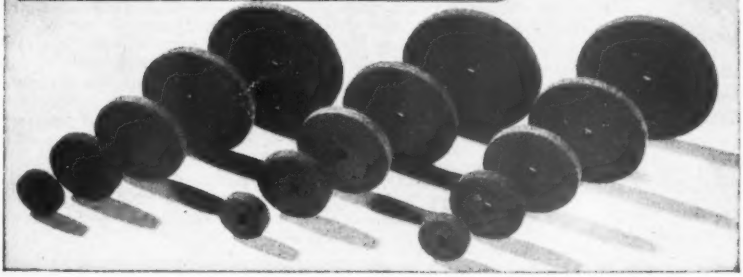
KEEP YOUR BONDS NOW — THEY'LL KEEP YOU LATER

The widest range of types, abrasives and bonds — wheels to do any job of grinding so accurately the finish can be measured in micro inches — rubber wheels for polishing or precision cut-off work. You get the results of half a century of invention, tests and improvements from our modern research laboratory. And, this same laboratory is open to you — tell us about any grinding problem you have and our engineers will tell you how best to whip it.

GRINDING WHEELS up to 3" in diameter in various bonds, including the new FV, the bond with a pedigree.

MOUNTED WHEELS in every practical shape, grain and grade, each firmly mounted on a steel shank.

CHICAGO GRINDING WHEELS AND MOUNTED WHEELS



TRY A TEST WHEEL

Write us what material you have to finish and size wheel you'd like. We'll send one promptly.

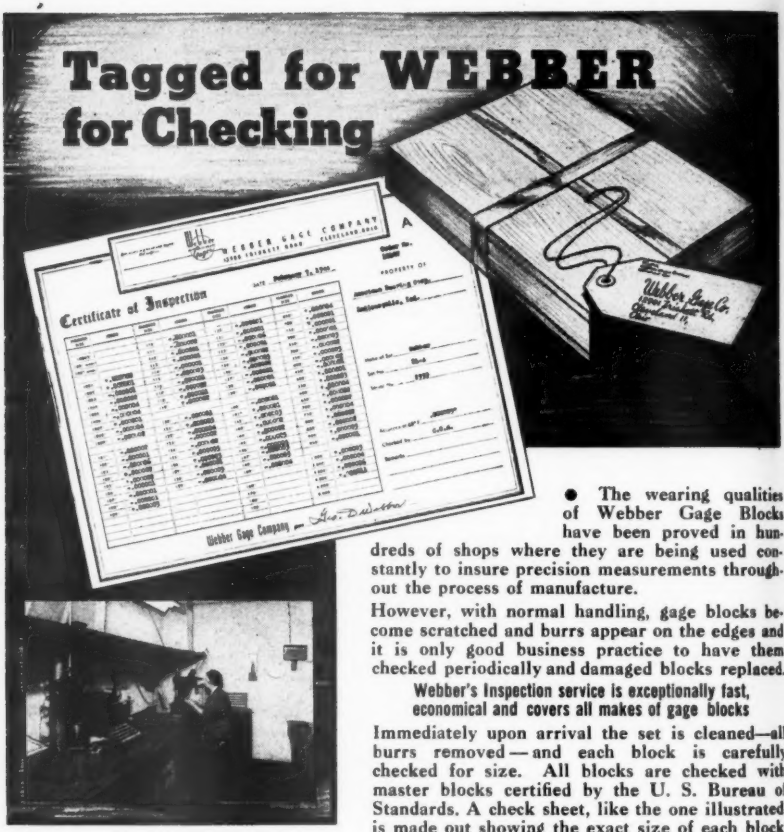
Write for Catalog of complete Chicago Line

Half a century of specialization has established our reputation as the small wheel people of the abrasive industry.

CHICAGO WHEEL & MFG. CO.

1101 West Monroe St. Dept. TD Chicago 7, Ill.

Tagged for WEBBER for Checking



Send your gage blocks, regardless of make, to Webber for checking and insure the continued accuracy of your product by the guaranteed accuracy of your gage blocks. For any further details consult Webber Gage Co.

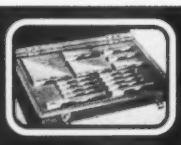
● The wearing qualities of Webber Gage Blocks have been proved in hundreds of shops where they are being used constantly to insure precision measurements throughout the process of manufacture.

However, with normal handling, gage blocks become scratched and burrs appear on the edges and it is only good business practice to have them checked periodically and damaged blocks replaced.

Webber's Inspection service is exceptionally fast, economical and covers all makes of gage blocks

Immediately upon arrival the set is cleaned—all burrs removed—and each block is carefully checked for size. All blocks are checked with master blocks certified by the U. S. Bureau of Standards. A check sheet, like the one illustrated, is made out showing the exact size of each block. This sheet is returned to you with a recommendation for replacement of any badly worn gages and a quotation on the cost of replacement. You can then advise us to make the replacements and we will make a 10% allowance on all worn gages replaced. Otherwise we will, at your suggestion, return the set making a nominal inspection charge. That's all there is to it.

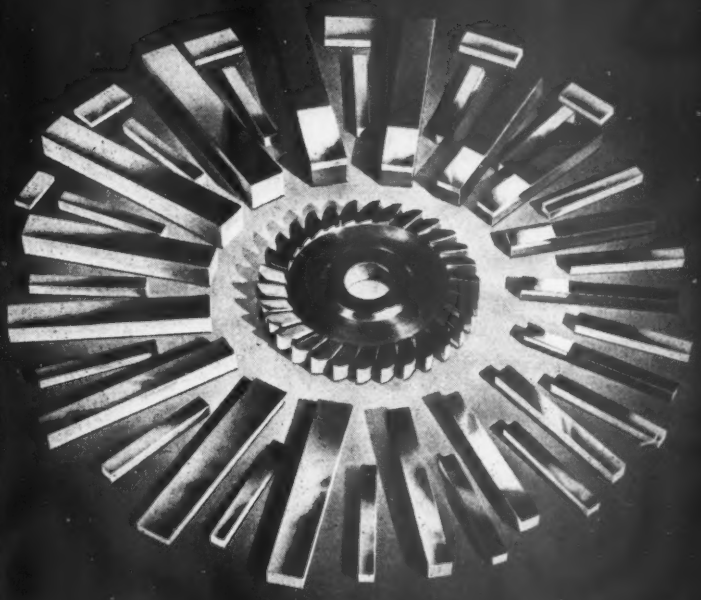
Our experience indicates that it is not only more economical to replace worn blocks with new but considerably more satisfactory than any reconditioning scheme.



Webber
GAGE COMPANY
12903 TRISKETT RD. • CLEVELAND 11, OHIO

BORCOLOY*

FAST CUTTING FERROUS TOOLS



*T. M. REG. U. S. PAT. OFF.

Announcing

THE CENTRIFUGALLY CAST BORON COBALT ALLOY

FOR "MIDDLE-RANGE" MACHINING OPERATIONS

Extensive research in the field of cutting alloys has resulted in the centrifugally cast ferrous alloy that incorporates the superior Hardness of heat treated steel (Rockwell up to C-71) with the "Red Hardness" of Cobalt, and the "Wear and Abrasion Resistance" of Boron.

Tools of BORCOLOY cut tough and heat treated materials with feeds and speeds greater than those ordinarily obtained on "bottle-neck" production jobs — particularly so on the special aircraft and ordnance materials that present such a challenge today.

In order to meet these grueling demands with maximum efficiency, may we suggest you try BORCOLOY TOOLS under your most unfavorable conditions, and let their ability speak for themselves to remove more metal faster, with finer finish, at less cost per unit.

GENERAL AIRCRAFT EQUIPMENT, INC.

Tool Division; South Norwalk, Conn.

Branch Offices: Newark Detroit Los Angeles

Canadian Sales: General Aircraft Equipment of Canada, Ltd., Montreal, P. Q.

HARGRAVE Chisels and Punches *Individually* TESTED

Cold Chisel

Half-Round Chisel

Cape Chisel

Diamond Point Chisel

Round Nose Chisel

Prick Punch

Center Punch

Solid Punch

Pin Punch

Pin Punch

Individually Tested

***for* Hardness, Toughness and Freedom from Flaws**

All Hargrave Chisels and Punches are trip-hammer forged (not drop forged) from our special analysis steel. Each tool is *individually tested* to insure longer life and superior performance.

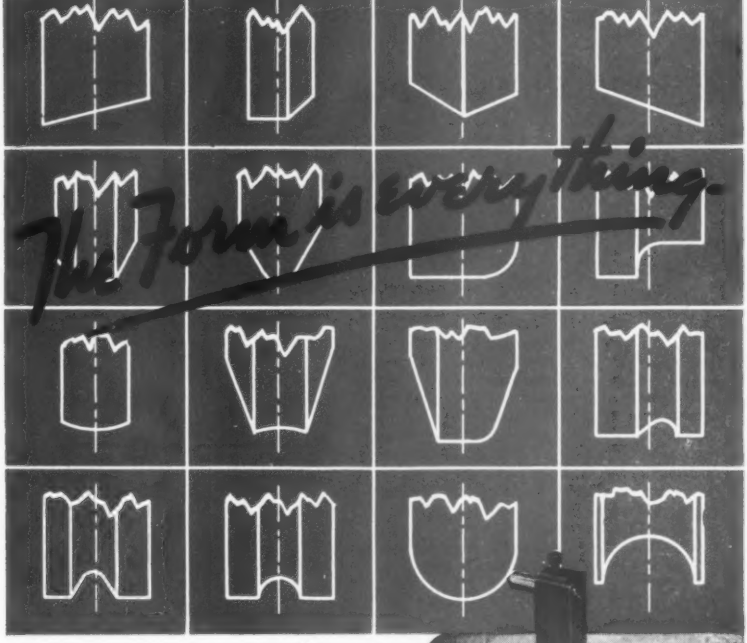
WRITE FOR CATALOG showing the complete line of Hargrave Clamps, Chisels, Punches, Brace Wrenches, File Cleaners, Washer Cutters, etc.

See Your Supplier

THE CINCINNATI TOOL CO.

1964 Waverly Ave. **Cincinnati 12, Ohio**

The CINCINNATI TOOL Co.



. . . and definitely so when applied to grinding-wheel forms. Dressing and repeating that form within an accuracy of .0001"—simple and rapid conversion to other jobs—eliminating time-wasting adjustments on the diamond post—these are items that can loom large in production costs. Reducing these costs and improving the form dressing is the prime object of the VINCO B-1 DRESSER (angle tangent to radius). Precision built—reliable year-in and year-out, and adaptable to nearly every type of grinder. Write for more detailed information.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

VINCO CORPORATION, 8873 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN. SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND.

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Hub Gages • Built-up and Special Gages • Gear Rolling Fixtures • Spline and Index Fixtures • Hydraulic Power Control Units and Distribution Units • Engineering, Design and Development

HERE'S HOW Broaching by *American* helps "KEEP UP THE BARRAGE"

Speed — speed in production — is a prime factor in the manufacture of big guns to keep our far-flung battlefronts ablaze. "More guns in a hurry" has been a constant demand from all parts of the world.

A high rate of production—plus fine finish and absolute accuracy—has been attained by *American* engineers in designing equipment for broaching lock step slots in 8" howitzer breech rings. The setup makes use of two *American* H-60-72 horizontal broaching machines and eleven different broaches to accomplish this task.

Whether your production requires fast output, excellent finish, or accuracy to close tolerances, whether it involves the use of standard or special machinery, let *American* engineers recommend the correct broaching equipment to do the job. *American's* complete broaching service—machines, tools, and engineering—is at your disposal. Write for details today.

Slots in breech rings for 8" howitzers are broached on two *American* H-60-72 broaching machines, identical except for various broaches required for this operation. Top photo shows fixture which indexes the part one-quarter turn after each cut. Lower photo is of the finished part.

Above: American H-60-72 broaching machine, used in broaching lock step slots in 8" howitzer breech rings. Turret holds five broaches and revolves after each four cuts to bring next broach in position for cutting. A similar set-up with six-broach revolving turret is used for completing the part.

MEMBER BROACHING TOOL INSTITUTE

American
BROACH AND MACHINE CO.
ANN ARBOR, MICHIGAN
•
BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF S

The Dickerman Die Feed

1. Handles coiled stock up to 3/16" thick, widths up to 4".
2. Accurate, automatic; cuts labor time and material waste.
3. Adjustable from 0" to its maximum feed length in increments of .001".

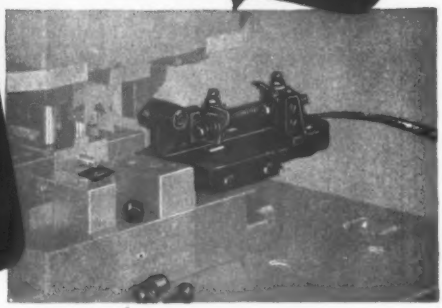
Send for booklet

The Dickerman Hitch Feed

1. Offers positive feed control, adjustable from 0" to its limit.
2. Feeds from any position on any style die.
3. Requires no connection to power shaft.

Made in two sizes, 2" and 4" Feeds

Send for booklet



YOUR PUNCH PRESS —

Works more hours each shift with a Feed attached to each Die

Set-up time for both feed and die is no longer than for die alone. With either the Dickerman Hitch Feed or Die Feed, the first cost is so low that you can easily have one for each of your frequently-used dies.

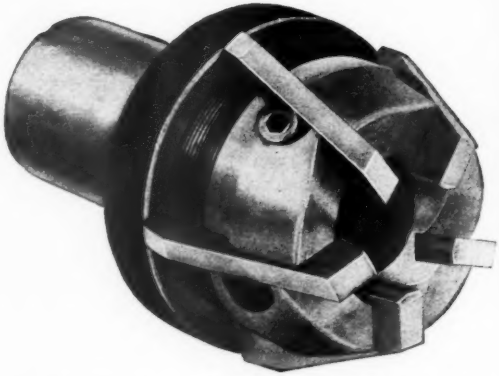
We Do Some Sub-Contracting

Frequently part of our facilities are available on sub-contract basis to manufacturers who need fine workmanship. We welcome such inquiries from firms whose product is essential to the war effort, and which will command an essential market after the war is won.

H. E. Dickerman Mfg. Co.

321TD ALBANY STREET SPRINGFIELD, MASS.

GENESEE ADJUSTABLE HOLLOW MILLS



(Standard Style H)
Facing & Counterboring
Tool

Cut Cost—Increase Production

with GENESEE inserted blade—
ADJUSTABLE HOLLOW MILLS
FACING & COUNTERBORING TOOLS
SPECIAL PRODUCTION TOOLS

Backed by 35 years experience our Engineering Department is always ready to serve you in your Production Tool problems.

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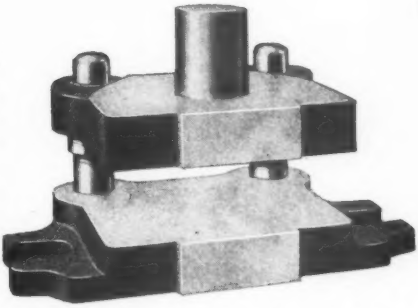
GENESEE
MANUFACTURING CO., Inc.
ROCHESTER 4, N. Y.

PRODUCTO
DIE SETS



Most of the die set problems involved in the production of metal stampings and in tool and die-making can be solved by one or more of the hundreds of combinations which are available in standard Producto catalog sizes.

Producto can and will fill your requirements speedily; with its five strategically located assembly plants. **Your source of supply is the telephone on your desk.**

For special applications, Die Sets and Bolster Plates, in any conceivable shape or size, can be supplied from Detroit plants. All accessories (dowels, springs, screws, etc.) also on hand at Assembly Plants.

Distributors of Dickerman Press Feeds and Producto Machine Vises.

Producto Catalog No. 9 can help you save time and money. For speedy service, phone nearest assembly plant.

THE PRODUCTO MACHINE COMPANY

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NEW YORK, 197 LAFAYETTE STREET

Grind it on a BESLY...

FOR FAST, ACCURATE, LOW-COST PRODUCTION

Enlarged view clearly shows needle cups positioned under clamping levers and convenient dial gauge.

An Actual Case...

The model 218-20" Besly Double Spindle Grinder, illustrated above, is used for grinding the steel needle cups for universal joints. Cam-operated spring clamping levers on feed wheel grip cups tight enough to prevent them from spinning on the plugs —*particularly when entering and leaving grinding zone.* In cycle of operations, cups pass dial indicators which gauge distance between the face of locating pins and ground face of the cups. At each pass .011 to .014 is removed—holding pieces to .002 for uniformity. Production: 900 pieces an hour.

When there's anything "special" about a grinding job—let Besly help you. Simple changes in a standard grinder may be sufficient or, perhaps, a new design is necessary. In either case, Besly engineers, who have given such service for more than half a century, can match your needs with the right grinder and the right abrasive—*to do your work exactly as it should be done.*

Ask for this Booklet...

Write for it today—*on your letterhead.* It's free! You will find it helpful for ready reference on grinding wheels and abrasives. Besly Titan Steelbacs speed production.

BESLY BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

CHAS. H. BESLY AND COMPANY, 118-124 N. Clinton St., Chicago 6, Ill. • Factory: Beloit, Wis.

For Mr. Webster's dictionary . . .

A new definition of fidelity

fi·del'ity (fi·del'i·ti), *n.*; *pl.*—TIES (-tiz). [F. *fidelite*, fr. L. *fidelitas*]. **1.** Faithfulness; adherence to right; careful and exact observance of duty, or discharge of obligations. **2.** *Elec.* The degree to which an electrical device, as a radio receiving set, accurately reproduces at its output end the signal or wave forms received at its input end.

3. *Industry.* That degree of permanent dimensional accuracy through resistance to wear as demonstrated by Elgin-made sapphire gages.

INSTANCES:

At Stewart-Warner Corporation—an Elgin Plug Gage, showing less than .00001 inch wear, has delivered over 220,480 close tolerance gagings on a job which wore out *steel* gages after 300 gagings!

An Elgin *Ring* Gage, checking a shaft charged with grinding compound, has now exceeded 328,950 gagings against 150 pieces for high speed steel and 500 for tungsten carbide.

At American Perforator Company—an Elgin Plug Gage has delivered some 520,000 close tolerance gagings over a 14-month period on parts which wore out *steel* gages after only 1 day!

Elgin Sapphire dimensional fidelity saves man-hours, materials, money! Elgin Sapphire Plug and Ring gages are setting new and almost unbelievable records for resistance to wear. Chemically inert at normal temperatures, their gaging elements of sapphire do not rust, corrode, burr or become distorted with use.

Approaching the absolute in dimensional fidelity, Elgin Sapphire Gages help eliminate the waste of worn-gage rejects; thus they save man-hours, money and materials.

Detailed information on complete range of sizes, prices and other gaging items are available on request.

America's best equipped Sapphire Fabricator

ELGIN NATIONAL WATCH COMPANY

Sapphire Products Division, Benton Street, Aurora, Illinois, U. S. A.

Elgin Sapphire Products present many advantages for all these types of equipment: GAGES • THREAD GUIDES • EXTRUSION DIES • KNIFE EDGES • SPRAY NOZZLES • SOFT WIRE DIES • BURNISHING TOOLS • PRESSURE VESSEL WINDOWS • WATCH CRYSTALS • HONING STONES

·ELGIN·
Sapphire Gages
DIMENSIONAL FIDELITY IN GAGING OPERATIONS

Carbide tipped tools in the few war production years have played a major role in shaping the implements of war and will reach new heights in importance in shaping the metal parts of a more peaceful world.

Diamond wheels are the only means of keeping carbide tipped tools accurately sharpened. Sufficient quantities of bortz diamonds have been acquired by J. K. Smit & Sons for diamond powder for these wheels and many other types of industrial diamond tipped tools.

Members of the staff of J. K. Smit, leaders in the industrial diamond field for more than a half century, have played no small part in paving the way for making available to the entire industry the vast quantities of diamonds required for war production.

● Secomet diamond wheels are made from powder reduced from whole diamond bortz by an intricate scientific process developed by J. K. Smit engineers. Uniform grit sizes ranging from standard 60 to 400 with 500 to 5000 grit available, provide the proper surface for any type of tool. Straight cup, flaring cup, dish and other standard wheel types as well as bones are available in resinoid and metal bonds Send for the new Secomet Diamond Wheel Price List Bulletin No. 45.

J. K. SMIT & SONS, Inc.
157 Chambers St., New York 7, N.Y. 6400 Tireman Ave., Detroit 4, Mich.

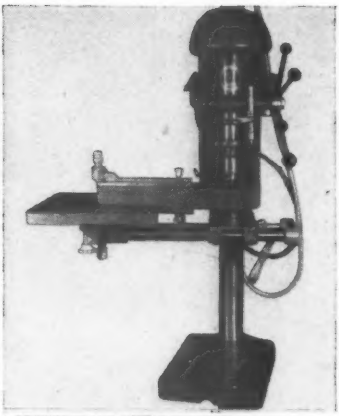
DIAMOND WHEELS • TOOLS FOR DRESSING WHEELS • CORE BITS • METAL WORKING TOOLS • POWDER

THE STUART ABRAZOR

AN OUTSTANDING TOOL FOR SMALL RADIUS WORK

A Time, Money and Labor Saver For Production Work Tool, Die and Pattern Makers And Everyone Who Works in Metal, Plastics, Wood or Glass

Fool-proof — labor saving — gets into troublesome places usually reached only with hand tools . . . does in minutes what once took hours! Solves all small radius problems . . .



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For Grinding, Shaping, Finishing, Polishing

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MANUFACTURED BY

STUART INDUSTRIES, INC.

75 Bellevue St., Newton, Massachusetts

309 Lafayette St., New York City, New York

When Safety Is A Requisite

CHICAGO

"SAFETY PLUS" SOCKET SET SCREWS

provide that safety

Socket Set Screws were conceived for the purpose of safety—safety for machine operators from protruding set screws in rotating machinery. Chicago "Safety Plus" Cup Point Socket Set Screws cut their own seats, embed themselves securely wherever applied, and are particularly desired as the means for holding in fixed relation such parts as are subject to severe vibration and extremely high revolutions per minute.

These products have sharp full threads of uniform pitch diameter, clean, true sockets, strength, toughness and hardness.

The complete line includes Cup Point, Half Dog Point, Oval Point, Flat Point, and Cone Point Socket Set Screws.

ARMY E NAVY

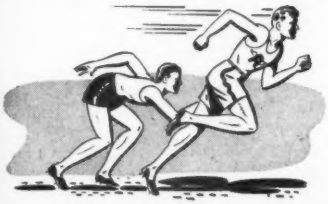
These Fine Products are sold only thru Authorized Distributors

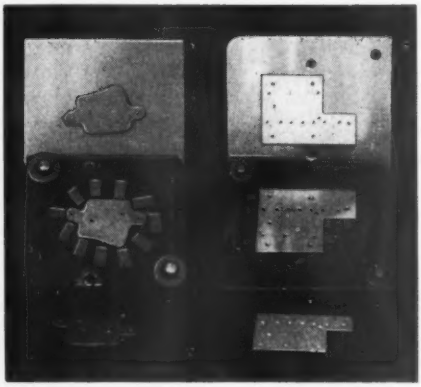
THE CHICAGO SCREW CO.

ESTABLISHED 1872

1026 So. Homan Avenue Chicago 24, Ill.

YOU GET OFF TO A *Head Start* WITH ALGOMA TEMPLATE DIES!

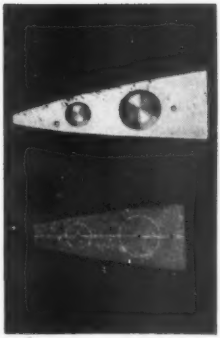




Almost ready while you wait . . . Algoma's dies, sawed from special alloy steel, sheered and filed to size, hardened and welded to inexpensive backplates . . . and there you are, dies in ¼ the time at ⅓ the cost . . . you're in production . . . "superfast." Pierce punches are individually replaceable, are of hardened and drawn tool steel and pressed into the blank die for piercing the holes in the part, adding life to Algoma dies. No matter what your problem, talk it over with us. We're sure there's an Algoma die to do your job.

ALGOMA HYDRO-FORM BLOCKS FOR FAST DELIVERY

Hydro-Form Blocks are made from hot rolled boiler plate, machined and polished to prevent scratching of parts. Mounted in the press with rubber blocks, they are furnished complete with pilot pins for location of parts. They are made to your specifications.



GET QUICK ACTION . . .
TELL US THREE THINGS . . .

The metal, the gauge, the size of the run. Send a template of the part. That's all . . . you'll get a figure fast. An opportunity to prove our assertions about Algoma Template Dies is all we ask.

FOR A HEAD START, BE WISE
SPECIFY ALGOMA TEMPLATE DIES

Algoma · PRODUCTS ·

3080 EAST OUTER DRIVE • DETROIT 12, MICHIGAN

IF IT'S AN ABRASIVE TOOL . . . "CARBORUNDUM" MAKES IT!

EVERY once in a while, somebody tells us that the reason he's not using an Abrasive by "CARBORUNDUM" on a particular job is because "CARBORUNDUM" doesn't make an abrasive product for that job. That always surprises us. For actually there's an abrasive product by "CARBORUNDUM" for all abrasive applications used by modern industry. You see, The Carborundum Company pioneered the use of man-made abrasives. For over half a century, "CARBORUNDUM" abrasive engineers have been working with tool and production engineers and others in industry to help perfect better ways of doing things through the effective use of abrasive tools.

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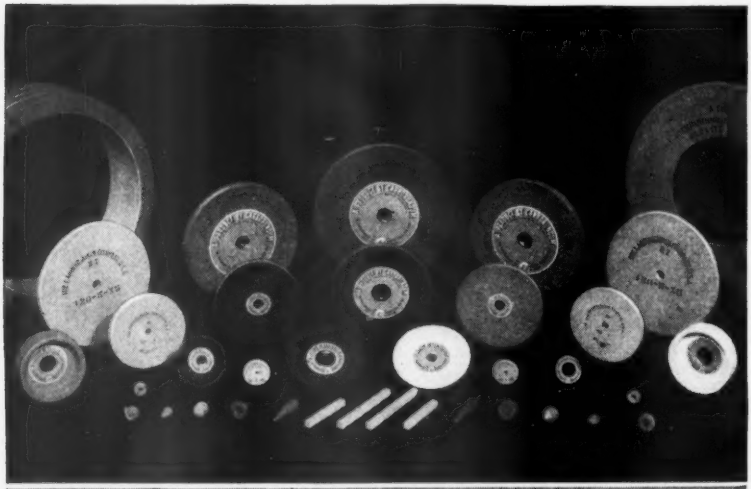

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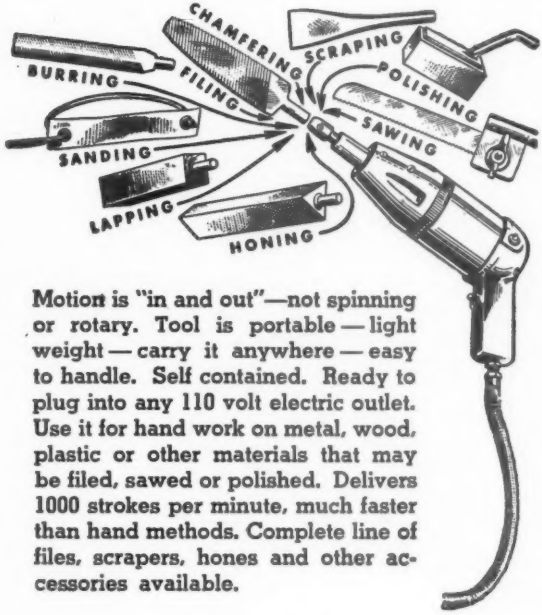

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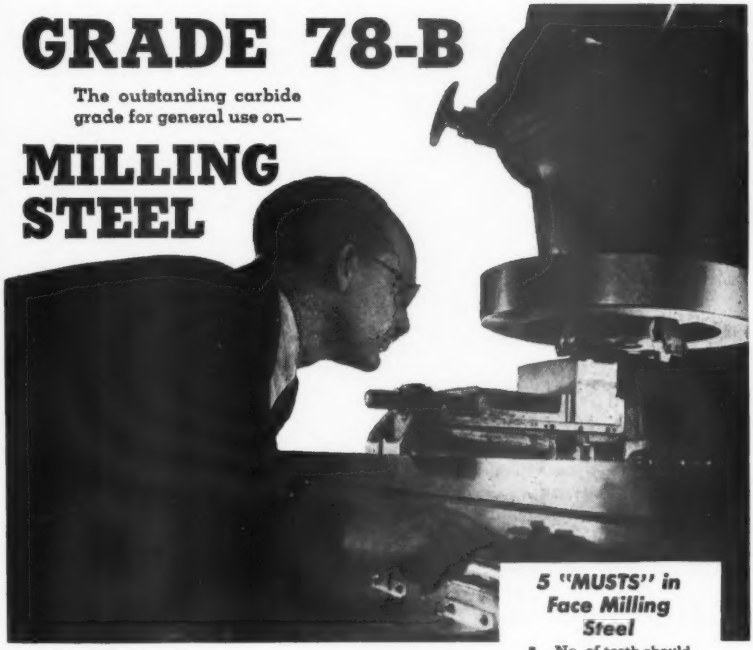

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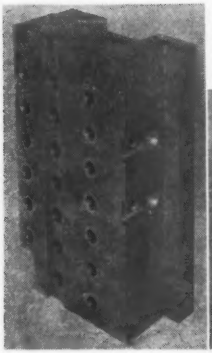

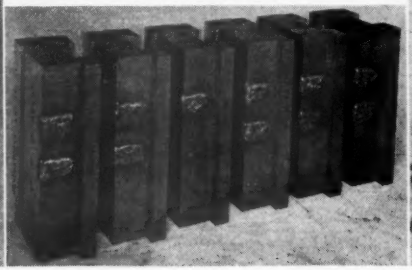

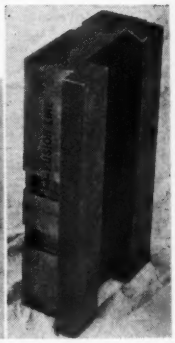

Left—After the machine work on these cast iron slides was completed, a change in location of the two side slots was required. **Center**—The side slots were filled with deposits of PHILLIPS "600". **Right**—After welding, new slots were machined, drilled and tapped. Note that all three operations cut through the line of fusion.

KEYWAYS had been machined and holes drilled on these iron castings when an engineering change required moving two holes to another location. By this time the castings represented an investment of more than forty dollars each. Since all machine work was to close dimensions it was impossible to preheat, or to use any welding process which would put enough heat in the piece to cause distortion.

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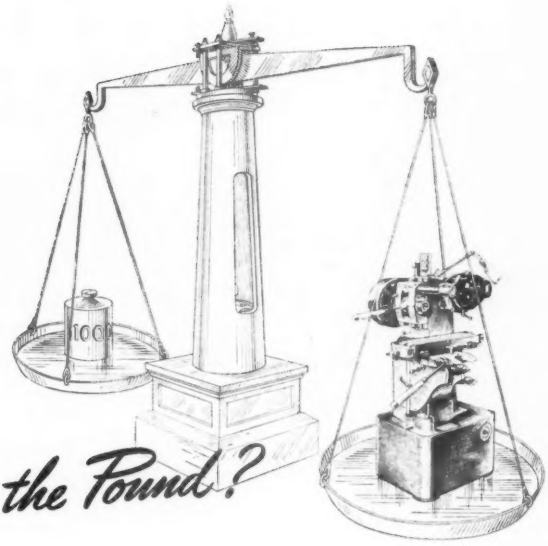

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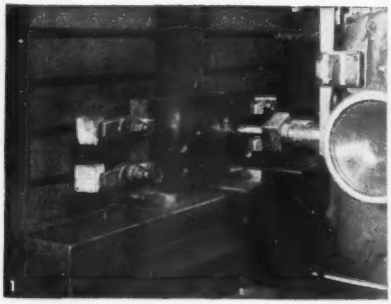

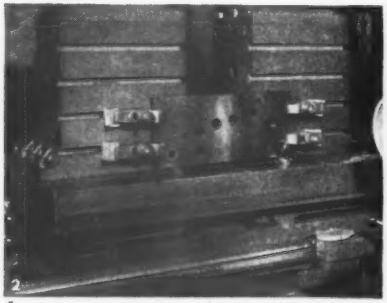

★ No. 1—Illustration showing convenience of jig plate boring. No. 2—Eight holes precision bored. Holes spaced within .0001 with total dependence of all spacing on automatic positioning means.

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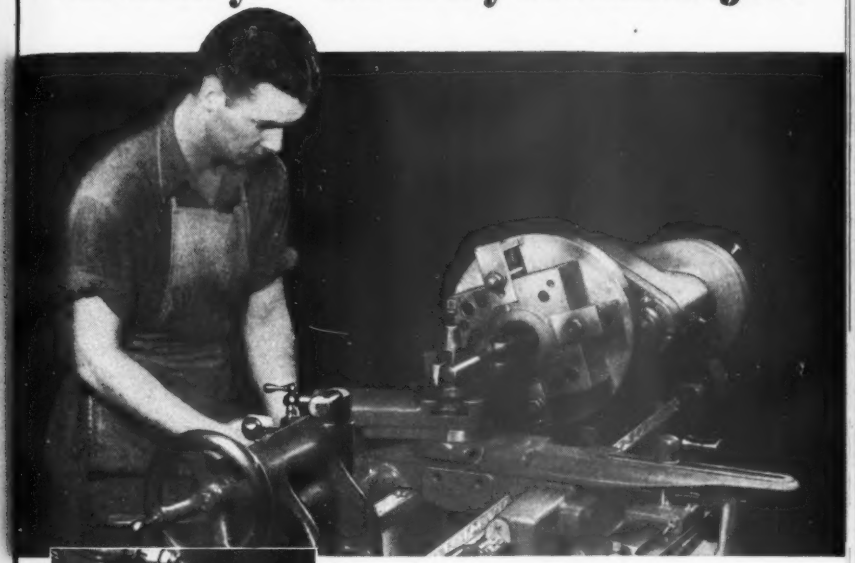

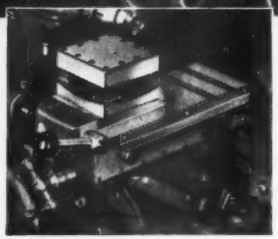

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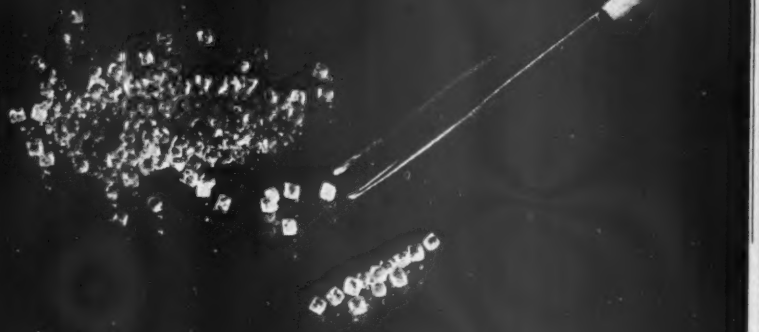

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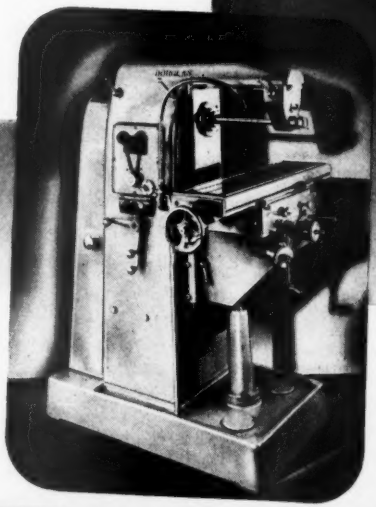

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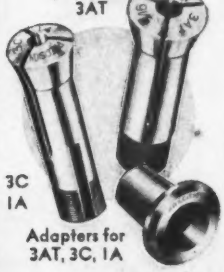
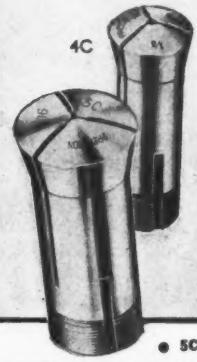


Adapters for 3AT, 3C, 1A



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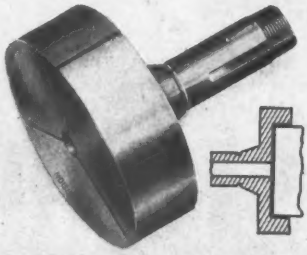

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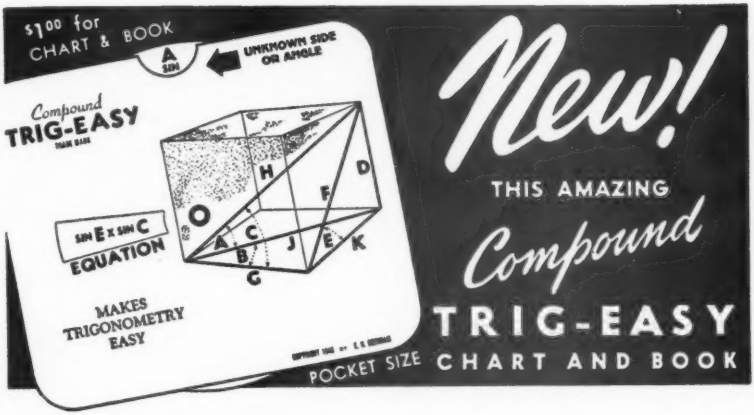

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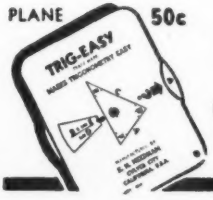

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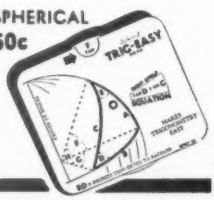

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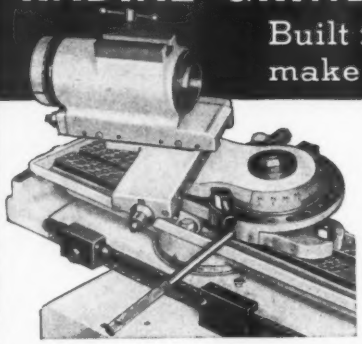

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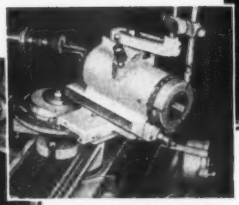
Designed to accommodate cutters from 3/16" to 10" in diameter.

Grinding radius on 4" Milling Cutter



Grinding radius on Spiral End Mill

Grinding radius on 4" Insert Tooth Face Mill

IF IT'S MADE BY LEE IT'S A *Knock-Out*

The *Knock-Out* **RADIAL GRINDING FIXTURE is NEW! Straight and tapered sleeves, collets, and chucks can be employed permitting most any type of cutter to be handled. Radii from the smallest to those of sizeable dimensions can be ground with accuracy and ease. Constructed in ball bearings, this fixture can be used as a Sensitive Ball Bearing Work Head as well as for grinding radii. Net weight, 40 lbs.**

K. O. LEE CO.

ABERDEEN, SOUTH DAKOTA

METAL *Stampings* DUPLICATED WITHOUT DIES

With DI-ACRO Precision Machines

If you desire to save time and critical materials on production of metal stampings or other small parts, then the DI-ACRO System of "Metal Duplicating Without Dies" merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.

SHEARS

Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. Shearing width—Shear No. 1—6". Shear No. 2—9". Shear No. 3—12".

BRAKES

Di-Acro Brake forms non-stock angles, channels or "Vees." Right or left hand operation. Folding widths: Brake No. 1—6". Brake No.2—12". Brake No. 3—18".

BENDERS

Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity—Bender No. 1—$\frac{3}{8}$" round cold rolled steel bar. Bender No. 2 and No. 3—$\frac{1}{2}$" cold rolled steel bar.

Send for Catalog "DIE-LESS DUPLICATING"

It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

← Pronounced "DIE-ACK-RO"

O'NEIL-IRWIN MFG. CO.

315 Eighth Ave. So.
Minneapolis 15, Minn.

Precision HONING

of diameters from .185" to 2.625" with a guaranteed accuracy of .0001"

With the Sunnen Precision Honing Machine you can hone and finish any internal cylindrical surface in any metal or plastic except lead or babbitt. Holes are straight and round and the surfaces produced are super-smooth—often from 2 to 3 micro-inches. This means longer life of parts, fewer rejects, and greater interchangeability of parts.

Here is a real precision machine that will increase production without the need for skilled labor. Any mechanically inclined worker can learn to turn out precision work in a few hours' time.

Let a Sunnen engineer show you how it can be used in your shop—on your jobs—or write for bulletin giving complete information on all the advantages of this machine.

SUNNEN PRODUCTS CO. 7947 Manchester Ave., St. Louis 17, Missouri

Canadian Factory: Chatham, Ontario

SUNNEN HONING

Speed • Accuracy • Finish

GRINDING "MAGIC" FOR CARBIDE-TIPPED TOOLS AND DIES

You can now precision grind carbide-tipped tools and dies amazingly faster, cheaper with Por-os-way—without burning, without discoloring. Get the Por-os-way wheel with green silicon carbide, the wonder grit that's back from war. Try Por-os-way once and you'll use it always!

2 TO 5 TIMES LOWER GRINDING COSTS

GROW with America! We can all earn more, buy more, have more after the war if labor, business and government are progressive, fair and cooperative.

RT. M. Reg. U. S. Pat. Off.

IN shop after shop you hear enthused machinists passing along the good word about Por-os-way, the sensational *open structure* precision grinding wheel that cuts hardest metals deeper, faster, *cooler*.

Men at the machines *ask* for Por-os-way. They know how it rough grinds *and* precision finishes . . . with astounding speed . . . fewer rejects . . . and longer life. They know its amazing three-year war record first hand, and they've shared in its success.

When *you* ask for Por-os-way and put it to work you'll cut grinding costs 2 to 5 times, help keep war production up and make the boss happy. For *proof* of Por-os-way's results call in a Por-os-way engineer. He and Por-os-way will open your eyes to new feats in grinding! A. P. de Sanno & Son, Inc., 464 Wheatland Street, Phoenixville, Pa., Since 1893.

← LOOK AT THE DIFFERENCE!

Your eye tells you at a glance why Por-os-way is *different*. See the *extra porosity* that gives you over 8 distinct operating advantages!

RADIAC*

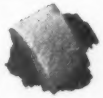
POR-OS-WAY*

The Precision Grinding Wheel

THE WHEEL THAT COSTS THE MOST AT FIRST . . . COSTS THE LEAST AT LAST

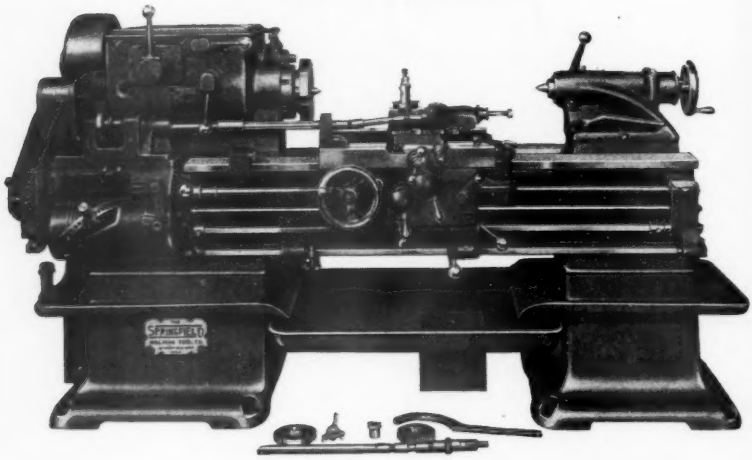
POR-OS-WAY SEGMENTAL SURFACE GRINDING MEANS NO MOAN, NO GROAN, NO GRUNT!

Give your surface and face grinding a BIG boost with Por-os-way segments. See how they cut faster, dig deeper . . . do it quietly by *cutting* the metal, not "scraping" the surface. No fuss, no racket and less time out for wheel dressing, too!



SPRINGFIELD PRECISION LATHE

Out in front!



● Headstock . . . twelve speeds . . . only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-Belt or silent chain drive.

Bed . . . permanently true—made of high test alloy to resist warp or marring under severe service.

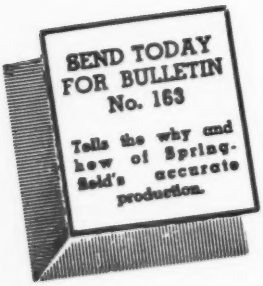
Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock—the SPRINGFIELD Lathe is *out in front!*



THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO, U. S. A.

HOW TO RELOCATE AND FINISH GRIND HOLES TO .0001" IN 1/3 THE TIME

NO LONGER is it necessary for toolmakers to labor over buttons and locating plugs to correct holes in hardened parts... not if you use the Moore Jig Grinder.

You can rely entirely on this unique machine to *mechanically* relocate and finish-grind straight or tapered holes to exact size and location in 1/3 to 1/4 the time required by conventional methods.

Accurate lead screws built into the Jig Grinder enable operators to guide the work rapidly to precise location within .0001" at the turn of the micrometer dials. This eliminates hours of checking on the bench and surface plate.

Working *to figures instead of to "fit,"* the Moore Jig Grinder takes die-making out of the "one-man" class and puts it on an interchangeable parts and assembly basis for the first time. Die, stripper and punch plates can now be produced concurrently with better alignment of mating parts and more uniform clearance between punch and die. Multi-section dies are quickly ground in *a single set-up*... eliminating separate-section hole grinding and the accompanying problems of accurately locating each section in the die bed.

MOORE SPECIAL TOOL CO., INC.
726 UNION AVENUE, BRIDGEPORT 7, CONN.

NEW 28-PAGE CATALOG describes Moore Jig Grinder's application to dies, drill jigs, gage parts, master plates and production parts.

MOORE TOOLS

Moore Jig Grinder

THE ONLY MACHINE OF ITS KIND

NOW'S THE TIME FOR

Your BIG "MOP-UP"!

RE-SOLICITATION is the keynote for this "mop up"! Bond rallies plus continuous competition help keep Bond subscriptions on a quota-topping climb. Poster displays, showings of the Treasury film, and distribution of the War Finance booklet and handy Bond-holding envelopes play an important part. But, above all else, see that every employee is asked *once more*—and urged *once more*—to meet his personal quota in the Mighty 7th!

The Payroll Savings Plan is the mainstay of every War Loan—your plant quota is vital to the success of the 7th! Remember, we have to make two drives in 1945 do the work of three last year. Put on a "mop up" final to help mop up the Japs, cut the tentacles of inflation—and help build postwar security!

THE MIGHTY 7th WAR LOAN

The Treasury Department acknowledges with appreciation the publication of this message by

Tool & Die Journal Staff

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council

See this New 30-Minute Movie and Save Months of Postwar Planning

This new Gorton Sound Motion Picture, in colors—"An Exact Duplicate"—shows latest techniques on many jobs like those you'll tackle after "V-E Day."

Yes, the 30 minutes that you'll spend seeing "An Exact Duplicate" may give you the practical solution to that tough postwar production problem that is on your drawing board today. This motion picture, filmed in color and sound under actual machine shop conditions, shows Gorton Tracer-Controlled Machines *in use* on plastic die and mold jobs, forging dies, high production profiling, milling, 2 and 3 dimensional engraving and manual and electric duplicating.

Available now without charge—for showing to technical societies, company groups, conventions, training schools, and other organizations. Write us today for further information, giving choice of three tentative dates.

(Above) Complex irregular shapes and contours are easily duplicated from inexpensive plaster models.

(Above) Flexibility of Duplicator Control solves many industrial problems.

(Above) A revolutionary idea in grinding.

(Above) It is simple to do production profiling of parts which must be held to close tolerances.

GEORGE GORTON MACHINE CO.

postwar DOLLARS *won't be* DUMB!

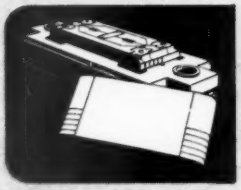
FAR-SIGHTED INDEED is the manufacturer of consumer goods who is thinking now of his postwar market in terms of *competing* for consumer dollars.

To be sure, new, revolutionary and ultra-modern postwar products will help, but it is just good, sound, business sense to remember that, once again, considerations of value, economy, efficiency and durability will decide where billions of dollars of consumer money will flow.

If you are planning a new or re-designed postwar product, the Barth Organization, with its unique and complete facilities for co-ordinating product designing with practical considerations of production economy, efficiency and low cost in tool, die and machinery, is ideally suited to serve you on your designing and tooling requirements.

BARTH PRODUCT DESIGNING, coordinated with practical considerations of economy and speed of production, is important services available at the Barth Organization.

BARTH ENGINEERS & DESIGNERS, backed by an organization of hundreds of skilled craftsmen, have served America's airplane, automotive, appliance and machinery industries for more than a quarter century.



BARTH TOOLS, DIES, gauges, fixtures and special machinery enjoy an enviable reputation for the finest precision workmanship, faithful adherence to delivery and production schedules.

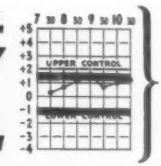
BARTH

STAMPING & MACHINE WORKS

DESIGNERS · MANUFACTURERS
DIES · TOOLS · GAUGES · JIGS
SPECIAL MACHINERY

DENISON AT 36TH STREET • CLEVELAND 7, OHIO

DIMENSIONAL QUALITY CONTROL



+ FEDERAL Dial Indicator Gages

Federal Indicator Gages analyze the drift away from the dimensions specified.

= Less Scrap, Better Work

By Dial Indicator Readings at Production, *You Are Able to Determine WHEN Dimensions are Going "Out-of-Control"*

FEDERAL Dial Indicator Gages *visualize* the progressive change, *during production*, in the dimension of the workpiece toward the Out-of-Control danger Zones. Thus you are forewarned when machine adjustments are about to become necessary.

Federal Dial Indicator Gages also enable you to obtain *accurate* Observation Readings for obtaining the Averages, Ranges, and other data necessary for making up the Control Charts. They eliminate guess work and enable you to obtain these readings more quickly with less chance of inaccuracies due to human variations in reading micrometers or other gaging instruments.

A Federal Gage, equipped with a Federal Dial Indicator, is a "natural" for Quality Control Engineers and their inspectors. Unlike the unreadable, conventional type gage, which shows only the go and no-go condition, it is possible with the Federal Indicator Gages to analyze the variation or drift away from dimensional requirements. In Quality Control parlance you obtain control, with Federal Indicator Gages, by Variables as well as by Attributes. Other type gages show *only* Attributes.

We have assisted hundreds of concerns in designing gages for controlling every type of dimension. Write our engineering department regarding your requirements. There is no obligation.

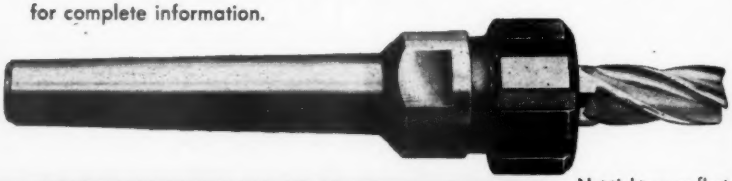
FEDERAL PRODUCTS CORPORATION • 1144 Eddy St., Providence 1, R. I.

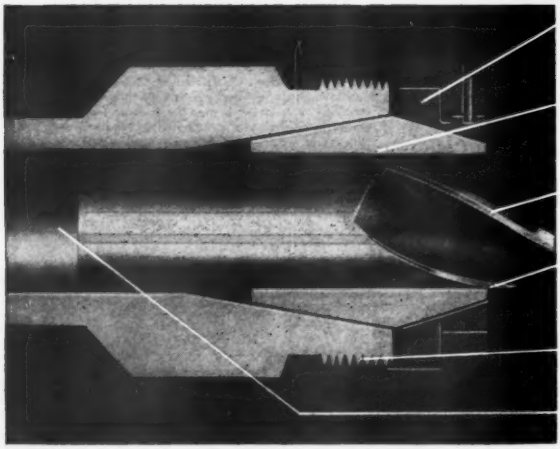
★ ★ ★ ★ ★ FEDERAL ★ ★ ★ ★ ★

UNIVERSAL COLLET CHUCK GRIPS TOOLS TIGHT AS A VISE

Permits Greater Speeds and Feeds Without Tool Flutter

Because they grip tools tightly on a continuous surface instead of at only a few points, Universal Collet Chucks reduce wear and breakage of drills, end mills, taps, etc. Their positive gripping power assures greater feeds and speeds over long periods, increasing production. By reducing locking effort 50%, they save valuable production minutes. They grip drill flutes, permitting stubbing. They will hold six tons in a longitudinal direction and fifty foot pounds in a radial direction. Write for complete information.





Nut tightens on floating sleeve, reduces locking effort 50%.

Collet grips on continuous surface — not at 3 or more points.

Grips drill flutes, permitting stubbing.

Guaranteed run out .001", one inch from chuck.

Hardened and ground threads.

No back up screw required for thrust.

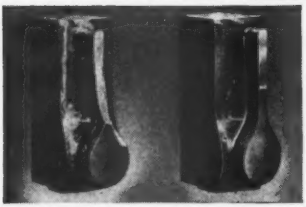
UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN Fighter Plane Given by Employees Employee Bond Deductions

Eureka TOOL STEEL ELECTRODES

SAVE vital tool steel for Victory

SAVE time in Reconversion to Postwar Products!



Die Unit repaired with Eureka Tool and Die Welding Electrodes. No heat treatment required.

Compositely Constructed Die Unit using Eureka Tool and Die Welding Electrodes. No heat treatment required.

Here are just a few examples of how Eureka Tool and Die Welding Electrodes are saving vital tool steel and countless man hours. 1. For repairing existing units that fail in operation. 2. For creating cutting edges or working areas in the composite fabrication of units using mild, medium, high carbon or S.A.E. steels as a base. 3. For correcting design by facilitating changes in contours, corners or edges during die "try-out" or "change-over" programs. 4. For rectifying errors made in manufacturing units eliminating conventional inserts. Shown at left are samples of Die units that were repaired and constructed with Eureka Electrodes. For additional technical information write today for our illustrated catalog.

★ *If you are making postwar plans now, we invite you to write us for complete information on Eureka Electrodes today.* ★

Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

223 LEIB STREET • FITZROY 3715 • DETROIT 7, MICHIGAN

Logan A NAME TO REMEMBER WHEN YOU THINK OF **BETTER** LATHES

BUILT BY MEN WHO VALUE PRECISION

The men who build Logan Lathes place a premium on precision. From their own daily experience in building precision machines they know how vital accuracy is. Not only Logan executives and engineers, but also the men in the shops, share in an all out determination to keep the Logan Lathe the most accurate in its field. This unflagging accent on accuracy from the first assembly to the final testing has done more than anything else to make the Logan Lathe outstanding in precision as well as in rugged strength. It explains, too, why so many industrial executives are depending on Logan Lathes both in tool rooms and on production lines. Ask your Logan Lathe dealer, or write for full information on all models of Logan Lathes.

No. 840
Quick Change
Gear
Turret Lathe

No. 200
Back Geared
Screw Cutting
Lathe

BRIEF SPECIFICATIONS common to all Logan Lathes: Swing over bed, 10½"; Bed width across ways, 6-15/16"; Bed length, 43⅛"; Size of hole through spindle, 25/32"; Spindle nose diameter and threads per inch, 1½"—8, 12 Spindle speeds . . 30 to 1450 r.p.m.; Size of motor . . ⅓ or ½ h.p., 1750 r.p.m.; Preloaded precision ball bearing spindle mounting; Drum type reversing motor switch and cord; Precision ground ways, 2 prismatic "V" ways, and 2 flat ways.

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS C-2

PLANE MAKERS *know their stuff*

Here's one industry where only the best equipment and machine tools are used, yes sir! That is why you'll find the DoALL Contour Machine right up in front—in tool rooms, machine shops, on production lines.

Fastest method today for machining metals, alloys, laminates, plastics, plywoods—the DoALL cuts through blocks, bars, tubing, stacked sheets—straight line or contour shaping—external and internal work.

Plane makers know their stuff—take a tip from them. Investigate the DoALL right now.

See* DoALL *Work

From your nearest DoALL service branch, a factory-trained man will gladly call and demonstrate its many uses, right in your own plant.

***Read About* DoALL**

Write for illustrated literature giving comparative data between DoALL and 10 other machining methods.

DoALL

INDUSTRY'S NEW SET OF TOOLS

CONTINENTAL MACHINES, INC.

1303 S. Washington Avenue • Minneapolis 4, Minn.

CTW
A CHAIN IS AS STRONG AS ITS WEAKEST LINK
A MACHINE IS AS GOOD AS ITS CUTTING TOOL...
Specify
CONTINENTAL
The precision cutting tool must be even more accurate than the machine, the fixture, or the finished part. "Continental" cutting tools made by Ex-Cell-O (they run from a standard counterbore to all types of broaches and to special carbide-tipped tools of intricate design) are acknowledged to be among the best obtainable in design and manufacture and in actual production results.
CONTINENTAL TOOL WORKS
DIVISION OF EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

Tools and gages to your specifications

Accuracy to thousandths . . . . . Yes, even millionths. Our complete inspection laboratory is scientifically air-controlled. The elimination of temperature variations assures positive accuracy to your specification.

Master gages measuring millionths of an inch enable us to build jigs, fixtures, gages, and precision parts to the most exacting Army and Navy requirements. Have our experienced toolmakers with an Army-Navy "E" reputation solve your tooling problem. Our 25 years of experience will save you time and costly errors.

The most modern machines and tools for producing special tools, gages and ground threaded parts are available to manufacturers with war orders. Reasonably prompt deliveries can be made. Send blueprints for immediate quotation and delivery schedule.

BUILDERS OF PRECISION TOOLS — GAGES • • JIGS • • FIXTURES

TOOLS *and* GAGES

INCORPORATED

3112 EAST 63rd STREET • CLEVELAND 4, OHIO

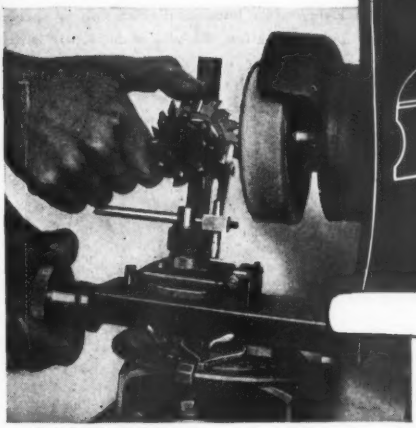
MICHIGAN 7230

Radiform
TRADE MARK REG.

GENERATED CARBIDE TOOLS
give big production increases

Production on part shown was increased from 40 to 500 pieces per hour with Radiform Generated Carbide Cutters like the one shown.

Initial cost of the new carbide cutter was less than the cost of a high speed steel cutter.



The Radiform set up to grind a high speed steel cutter. The set-up is the same for Carbide Cutters using a Diamond Wheel.

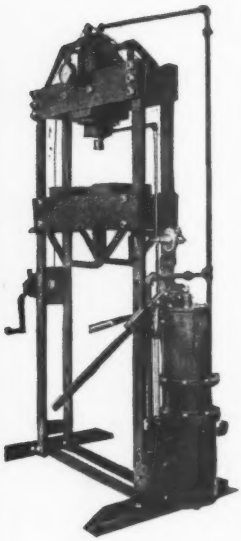
Pat. Pending

Analyze your shop problems and see what the Radiform can do for you. Wire or write today for descriptive literature and prices.

[redacted]

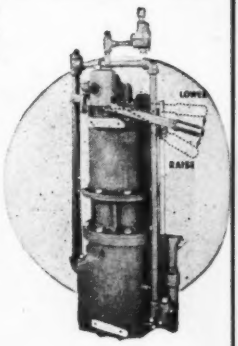
Adaptable to any job, these

Low-Cost KRW
HYDRAULIC ARBOR PRESSES
SAVE TIME, SPACE AND MONEY



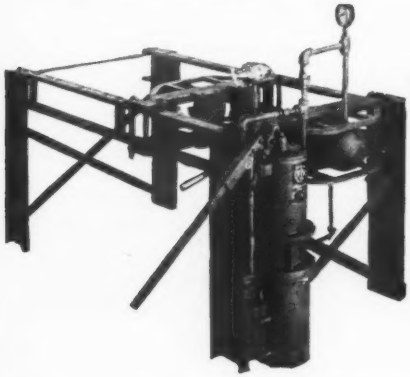
KRW Presses are designed to handle the great majority of pressing, bending and straightening operations normal to most industries. In addition, KRW Presses are adaptable to literally hundreds of special jobs. Using low-cost dies, manufacturing costs on many items are greatly reduced.

Using air pressure varying from 100 to 225 pounds, the resulting hydraulic pressure varies with the air pressure used. A built-in air regulator permits exact duplication of pressure on every stroke . . . this is important on many operations. KRW Hydraulic Arbor Presses are available for either vertical or horizontal operation or specially built to handle a particular operation. We also manufacture suitable capacity air compressors. Write for fully-illustrated Hydraulic Arbor Bulletin. K. R. WILSON, Dept. 18, 215 Main St., Buffalo 3, N. Y.



THE KRW SPEEDI-BOOSTER

THE REASON WHY KRW PRESSES ARE FAST AND ACCURATE. The KRW Speedi-Booster eliminates the need for the conventional Capstan wheel or pumping lever. Instead, it uses compressed air as the motive power operating the ram. Because the compressed air is controllable through a pressure regulator, any desired tonnage pressure at the ram can be obtained and duplicated. Ram movement (up, down or stop) is instantly controlled with the slightest fingertip movement of the lever.



K. R. WILSON
BUFFALO 3, NEW YORK

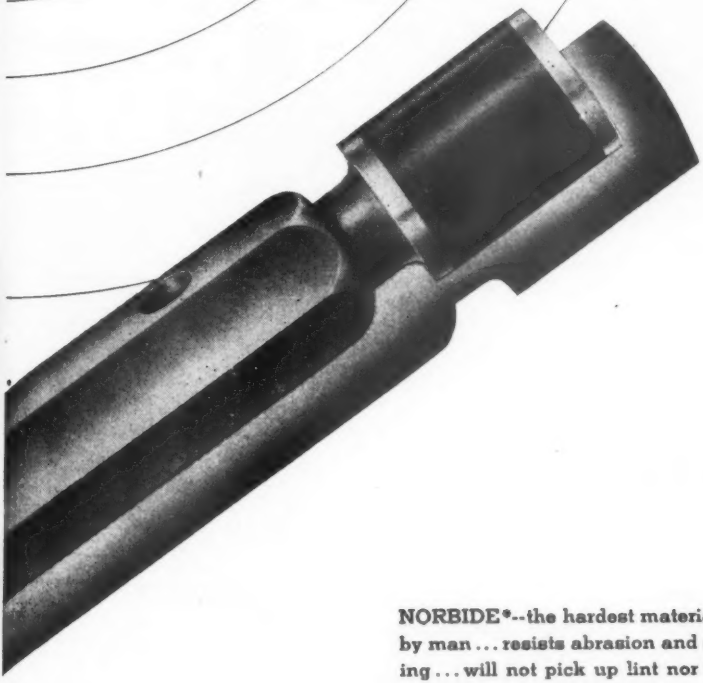
PLEASE NOTE NEW ADDRESS

K. R. WILSON
215-217 Main St., Buffalo 3, N. Y.
Please mail me a copy of your Hydraulic Press Catalog.

Name.....
Address.....
City..... *State*.....

NORBIDE*

Increases Gage Life 100 Times!



NORBIDE*--the hardest material made by man ... resists abrasion and scratching ... will not pick up lint nor become charged with metal particles ... lighter than aluminum ... outwears conventional measuring devices 100 times and more.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

*Reg. Trade-mark

"saved $400 in 2 minutes....."

says **AIRCRAFT MANUFACTURER**

(Name on request)

Thomas

PATENT APPLIED FOR

TAP EXTRACTOR and METAL DISINTEGRATOR

for PRECISION ARC-BORING

The press department was "crying" for an expensive die in which a punch point had been broken. With the THOMAS, broken steel was removed in 2 minutes from .090 hole with a .075 electrode, placing die back in production immediately.

You, too, can effect such saving with a THOMAS in your plant, removing broken or imbedded Taps, Drills, Reamers and Studs without damage to valuable workpieces . . . drilling holes and cutting slots, keyways and channels in heat-treated metals, . . . scarify and drill holes in hardened dies . . . and many other money-saving operations.

Easy to operate—No adjustments—Low operating and maintenance—4 models to fit any price or operating condition.

SEND IN COUPON FOR LITERATURE OR A DEMONSTRATION IN YOUR PLANT

Clinton

MACHINE COMPANY

CLINTON, MICHIGAN

CLINTON MACHINE COMPANY
CLINTON, MICHIGAN

Gentlemen:
Please send literature on Thomas Tap Extractor and Metal Distintegrator. ☐ We would like a demonstration in our own plant. ☐

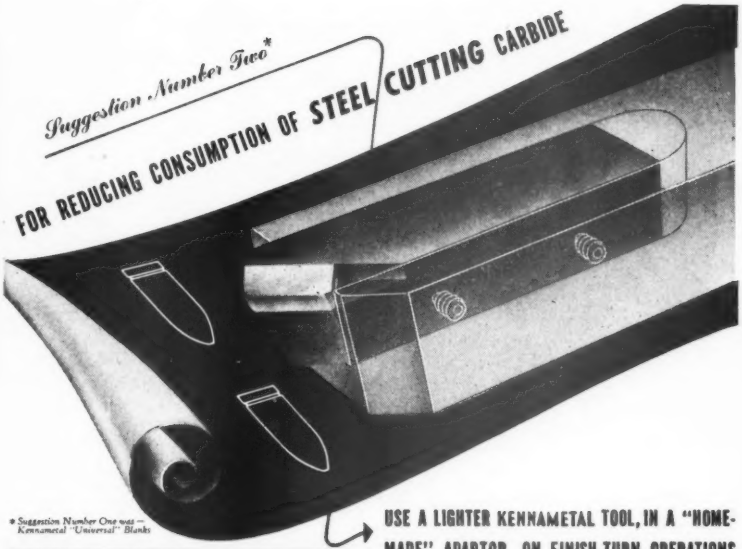
NAME.....

ADDRESS.....

CITY..... STATE ..

*Suggestion Number Two**

FOR REDUCING CONSUMPTION OF STEEL CUTTING CARBIDE



* Suggestion Number One was — Kennametal "Universal" Blanks

USE A LIGHTER KENNAMETAL TOOL, IN A "HOME-MADE" ADAPTOR, ON FINISH-TURN OPERATIONS

Efficient use of carbide tools—always important—is imperative today, because of the demands of a large shell-making program. Every possible means to promoting economy should be utilized to avoid tool shortages, and consequently delayed production.

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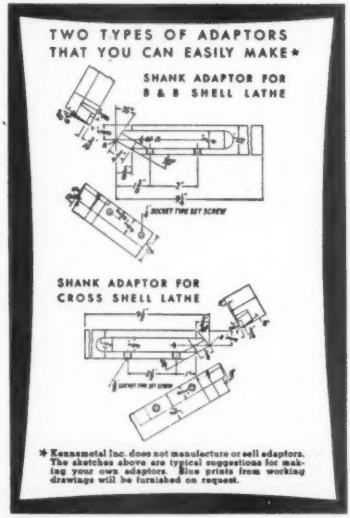
The diagrams at the left show how ¾" square-shank tools can be mounted in adaptors that fit tool holders built to take shanks 1¼" or 1½" wide. Similar adaptors can be devised and made by you for other conditions. On lathes built to take tool shanks 1" x 1½", or 1" x 1¾", it is economical to use a ½" or ¾" shim under a 1" square-shank Kennametal-tipped tool.

By using inherently efficient Kennametal, in conservative size blanks, as suggested above, a two-way saving in carbide consumption can be effected.

Kennametal engineers, fully experienced in the application of cemented carbides, will be glad to help manufacturers get the best and longest tool service in shell production.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SOCKET TYPE SET SCREW
SHANK ADAPTOR FOR
CROSS SHELL LATHE
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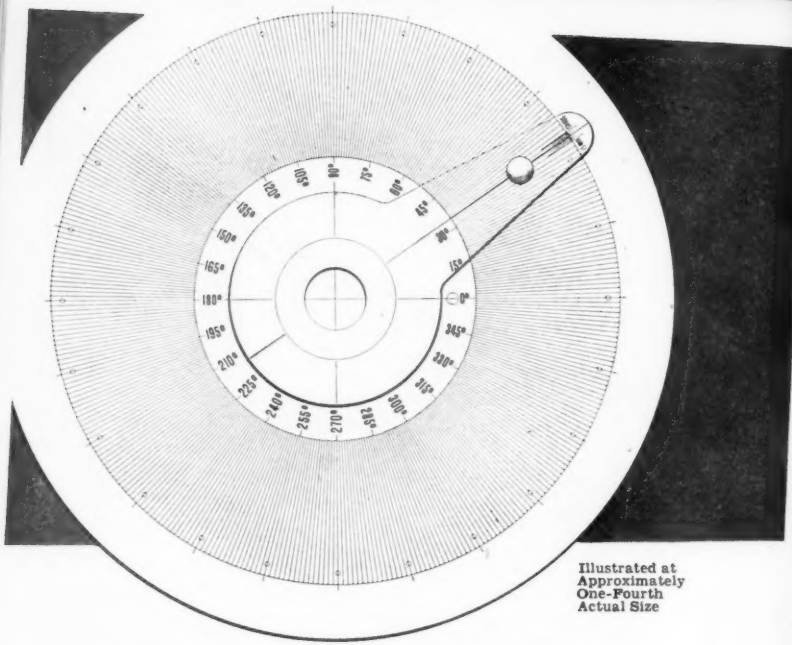

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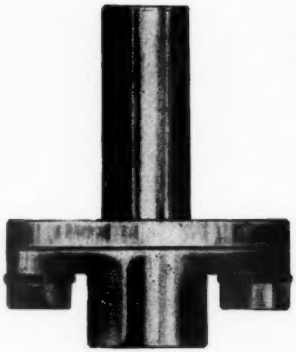

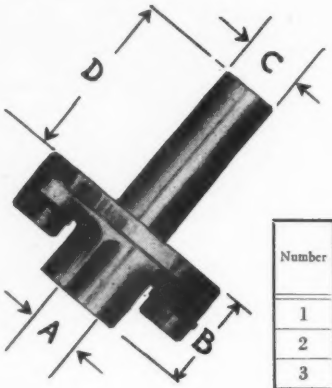

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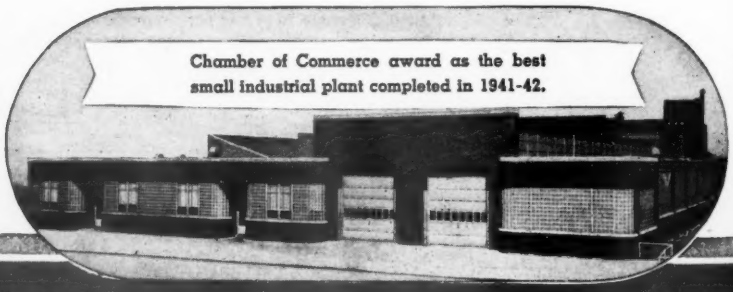

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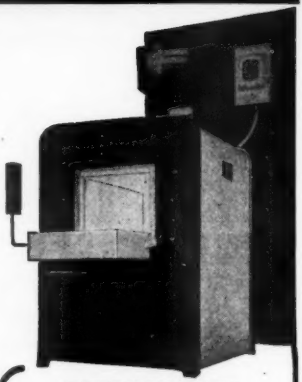

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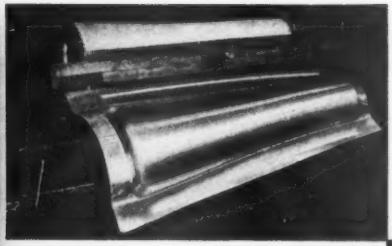

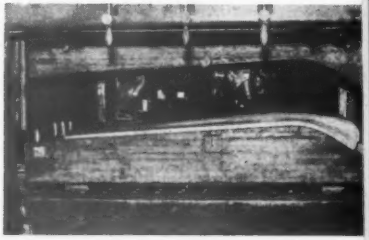

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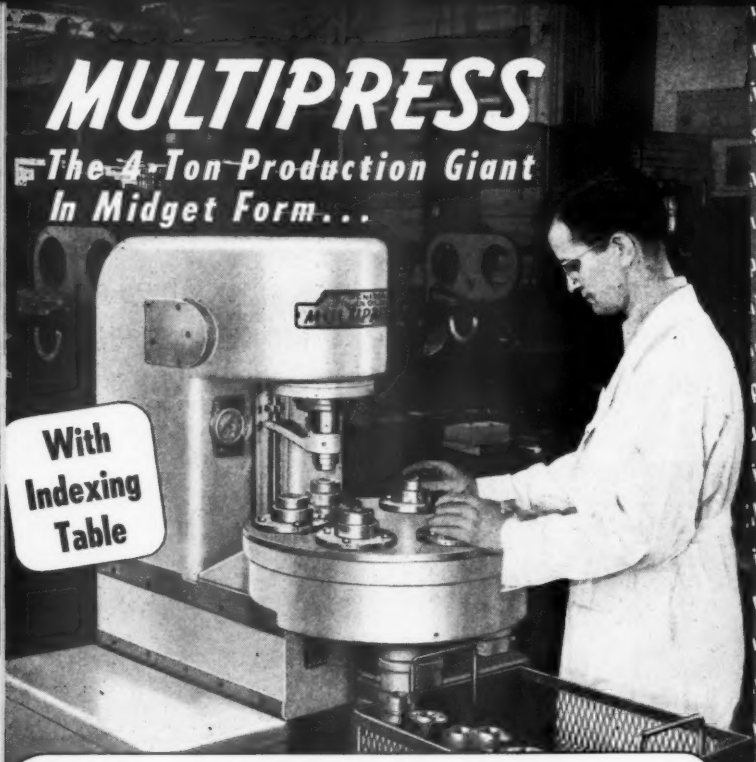

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The effectiveness of the power transmission would be a function of the mutual holding power of the two chuck faces. An oil film between the two finely finished surfaces would minimize mechanical friction and permit a judging of the magnetic drag. A rough approximation of the clutching action could be attempted by trying different field strengths, from "full off" to "full on". The body of the driven chuck, in combination with a flat belt, could be used as a "power take-off" whereby a test load could be applied.

The newest permanent magnet alloys have magnetic permeabilities undreamed of prewar and give rise to fascinating speculation as to postwar applications in the field of power transmission.

The problem of varying the magnetic field during operation is certainly of much less intricate solution than that of varying the pitch of an aircraft propeller while in flight!

What might not be done with the new friction-braking materials, produced by powder metallurgy methods, in combination with permanent magnet inserts?

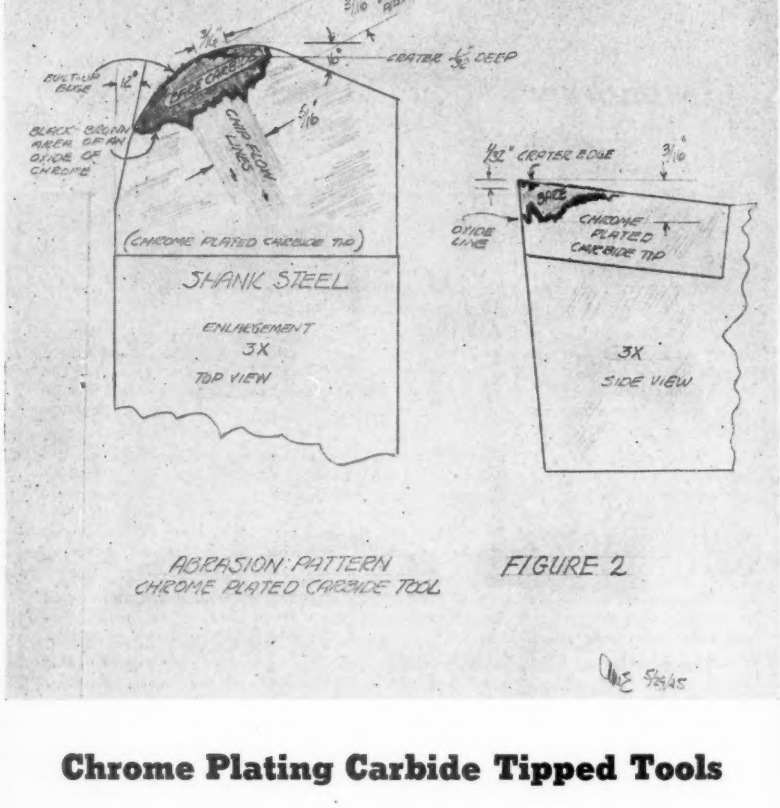
We expect to see permanent magnets made up in laminated form for better field characteristics. Admittedly, the new alloys are tough and next to impossible to machine economically. Because they are cast alloys the postwar door is opened to the precision investment casting or "lost wax" technique. Thin, flat laminations could be cast to such close tolerances that only a slight surface grind would be necessary as a finishing operation.

In the industrial chemistry field, agitators inside of vats could be driven without any direct mechanical connections; hence no bearing holes, no packing troubles and no contamination by lubricants. A sufficient area of the vat shell could be made of a non-magnetic material to permit the "clutching" of the magnetic fields of permanent magnet driving and driven members.

Speaking of propellers, anyone who has been caught without a spare shear-pin when his outboard motor propeller hit an under-water obstruction would gladly pay a little extra for a magnetic clutch, incorporated in the propeller hub, that would slip under those well-known circumstances.

If the foregoing editorial divergence, in addition to possibly ruining two otherwise perfectly good chucks, could contribute toward postwar work for but one designer, one patternmaker, one toolmaker, one machinist and one salesman, the investment would be many times repaid.

ewp



Chrome Plating Carbide Tipped Tools

by A. W. Ehlers
CONTRIBUTING EDITOR

The reader is no doubt familiar with the various processes and techniques employed in the chrome plating of high speed steel tooling. The results have been written up rather completely in the various technical journals to the effect that on certain applications, increased tool life has been the case. The writer's experiments with chrome plating of high speed tools indicates that specific applications such as taps, reamer and pilot bars, etc., do react favorably. However, for the general purpose treatment of all types of high speed tooling, the writer finds that cyanide nitriding is much more successful. A brief basic resume of the writer's findings concerning nitriding appeared in the June 1944 issue of TOOL & DIE JOURNAL, page 87.

Experiments involving the chrome plating of carbide tipped tools resulted from a routine error in the tool control

department. Slitting saws were giving our department trouble due to the fact that a fast cut when slitting an aluminum tubular shape resulted in "welding" of the aluminum upon the sides of the circular saw and thus destroying the relief angle. Different lubricants were tried, sulphonated base oils were added, but all to no practical improvement. Even the hollow grinding of additional relief was attempted. Finally, chrome plating the entire saw gave a slight improvement of the situation and increased the tool life per grind for this particular operation. The error occurred when a saw of similar size, nitrided for steel slitting, was sent to the plating department. This saw went thru the standard plating routine and was forwarded to the aluminum job in question. As the operation was on piece work, the operator soon recognized that this particular saw produced an unusual run of pieces and luckily reported same to the tool crib. The reason for this particular saw was investigated and the nitriding-chrome plating procedure was immediately adopted for the aluminum department on all slitting saws. The conclusion reached by the tool control department was that the nitrided case and the chrome plate had resulted in providing a non-friction and a non-welding surface that the single chrome plating on the untreated high speed steel did not accomplish. The writer's conclusion, substantiated by digging into several learned references, was that chrome plating reacted in direct proportion to the hardness of the base or parent metal underneath the plate. As the nitrided case had provided the extremely hard surface, very similar to the carbides of metals, why shouldn't the standard cutting carbides provide the same type of hard base material?

The first step was to find out how a carbide tipped tool would plate, as to whether the resistance of the sintered carbide to the plating current was comparable to that of tool steel. The old standard resistance circuit using the voltmeter and ammeter and involving "R equals V/I" (or resistance in ohms equals volts divided by amperes) was tried and it was found that the sintered carbides were only slightly higher in resistance than hardened high speed steels. Therefore, the carbide tipped tools should plate satisfactorily, and they did.

After several attempts involving adjusting the current and time of immersion in the plating bath were made, it was found that a voltage of 8 to 9 volts and a current of 120 amperes produced a good uniform plate. Two minutes gave a depth of plate varying from .0001" to .00015". The plating equipment used was the standard sulphate bath type using lead anodes and chromic acid as provided in the patents issued to United Chromium, Inc., and leased to users in the trade.

The tools to be plated must be absolutely clean of all grease, cutting and lapping compounds and the cutting edge of the carbide tip must be carefully honed on a 180-220 grit diamond lapping wheel. The edge must be as free as possible from microscopic irregularities. Any "feather edge" will result in the plate being "burned" and this in turn will result in a cracked plate that will peal easily.

A simple heavy turning tool, used in the turning of iron castings was selected as the test tool. Figure 1 shows its general shape and dimensions. This tool was selected because it was used on a battery of automatic turning lathes where a very low tool life was being experienced due to heavy foundry scale, casting shifts and chilled hard spots. Due to the type of equipment and the

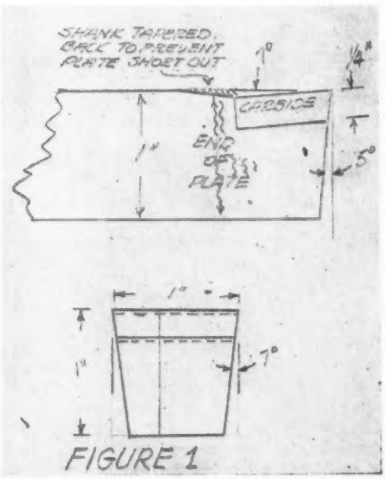


FIGURE 1

nature of the turning operation, the tool operated at 175 surface feet per minute at .048" feed per revolution and was taking an average cut of .130" on a side. The Brinell hardness of the cast iron varied from 185 to 220.

An overall average for the unplated carbide tool resulted in a tool life of 95 to 105 pieces per grind. The low performance being 40 to 50 pieces, and the high being 120 to 135 pieces.

A trial run of six tools was issued to one machine and the average tool life per grind sky-rocketed to 290 pieces per grind with the low being 197 pieces and the high 342 pieces.

Each tool returning to central tool grinding was examined under a glass by the writer and sketches were made of the abrasion pattern and the general tool condition. Figure 2 shows an average condition of the tool as summed up from the collected sketches and for various heats of cast irons. The most interesting section of the abrasion pattern is the well-defined chip flow lines as depicted in the sketch. These lines are sharply defined as to boundary limits and show upon the polished chrome surface only when placed in a properly illuminated position. The plate is not worn thru but only dulled.

It was found that a tool of improper radius shifted the center line of the chip flow lines. It was proved by tool life experiments that when the center line of the chip flow lines closely approximated an intersection with the point of radius that the radius was correctly generated and was of the correct magnitude. This suggests to the writer an empirical method of determining the correct radii for particular tooling applications.

After an extended tool run, the reader will note from the sketch that the plate is completely abraded away from the edge of the carbide tip to an average distance of $\frac{3}{16}$" from the cutting edge. The built-up edge to the left of the crater is very regular and the tool might have continued cutting without damage for quite an increased number of pieces. However, it seemed good practice to remove the tools at this stage to insure good regrinding. The average crater approximated $\frac{3}{16}$" in width and about $\frac{1}{32}$" in depth. Thus, regrinding usually necessitated only a top grind of $\frac{1}{32}$" and in most cases the profile did not need regrinding other than a very slight touch-up on the diamond lapping wheel to remove the initial plate for the subsequent replating operation after grinding.

The writer cannot offer an entirely lucid explanation for the width of the "bare carbide area" being almost twice the width of the chip flow line area other than because cast iron produces a very brittle chip, the abrasion of the bombardment of minute cast iron particles adjacent to the cut fans out ahead of the main chip body. This theory is somewhat substantiated in checking the abrasion patterns of plated tips used on mild steel; the "bare carbide area" is much reduced and approached the width of the chip flow line boundaries.

A peculiar black-brown line defines the "bare carbide area". The writer has not had the facilities to determine a quantitative or qualitative analysis of this line material but suspects it to be one of the oxides of chrome or a combination of same with the tip carbides and the binder used in sintering.

This well-defined line is quite noticeable to the operator of the lathe due to the contrast between the bright chrome plate and the dull grey-black of the bared carbide tip. Therefore, the piece work operator soon learns to remove the tool at the proper time for regrinding. This visible indicator for tool removal creates not only an economy in actual tool life but considerably reduces regrinding time. It also prevents complete wreckage of the tip by preventing a dull tool being left in the machine until the cutting pressure finally fractures the tip.

As the tool does not crater badly, thus resulting in a more or less fixed cutting edge, it is evident that the surface finish of the "end of the run" pieces will be comparable to the "beginning of the run" pieces.

The writer is now experimenting with finishing tools for both cast iron and steel and the preliminary data shows that the micro-inch surface finishes produced are better when using the chrome plated carbide tools. Of course, such factors as surface speeds, lubrication and machine condition must be held as constants when making such comparisons.

It also occurs to the writer that carbide tipped plug, ring and length gages

(TO PAGE 130—PLEASE)

Consolidated Vultee Tooling Shortcuts

Dural templates insure accurate centers . . . Redesign cuts tools and operations to less than one-third . . . Deformed slugs easily removed from openings.

Multipunch Templates For Temporary Tooling

by Thomas A. Dickinson

Tooling costs and production time requirements have been greatly reduced at Consolidated Vultee Aircraft Corporation, San Diego, California, by using multipunch templates in place of drill templates for temporary tooling setups.

The multipunch templates are made from .064" dural template stock, and they are shaped like the parts which are to be produced so as to minimize the chances for errors in the setting of stock stops. Their function is to provide drilled holes which will properly locate the hole-piercing units of the multipunch.

The sizes of the locating holes are clearly stamped on each template, and a color code is also being used to enable setup men to select the required dies with minimum difficulty.

All of the multipunch dies have been altered to permit use of multipunch templates simply by grinding two grooves (each with a diameter of .080" and a depth of .035") around the respective die tops. The upper groove is located .104" from the top of the die, so that approximately .064" of material can be removed in the process of sharpening. The second groove is situated .064" below the first groove.

Each job is set up outside of the press on special setup plates in order to reduce the shut-down time on the press. The setup plates are made by drilling 12' x 12', 12' x 24', and 24' x 36' steel sheets with $\frac{3}{8}$"-18 holes at 1" intervals.

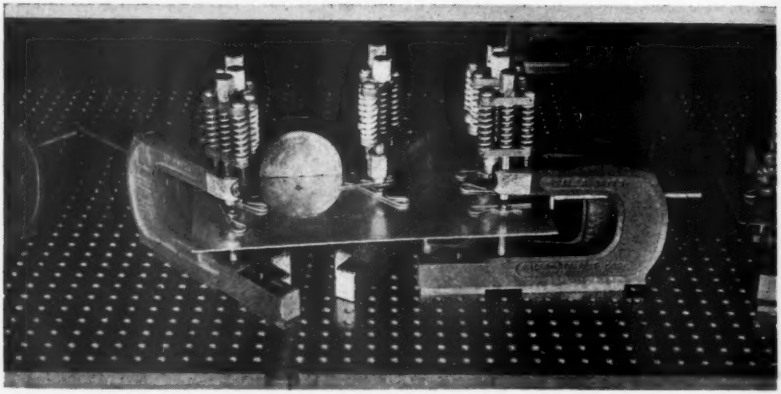
Required hole punching units should be attached to the setup plates so that the stock stops on the units can be used to position the parts, and at the beginning of each setup one hole punching unit should be fastened to the setup plate for the purpose of insuring maximum ease in loading and unloading parts.

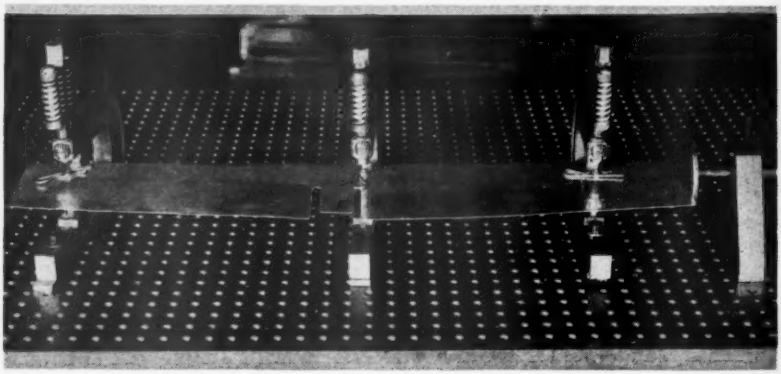
A pin lock is placed in the lower groove of the multipunch die, and over this a hole in the multipunch template is positioned. Then a second pin lock is placed in the top groove of the die.

Only two or three hole punching units must be fastened to the setup plate, since all of the remaining dies will be held in the proper positions by the multipunch template and pin locks. The pin locks can be removed by means of a standard Allen wrench, which has been

Two separate multipunch jobs being run on a single press.

In this multipunch setup eight different dies are used. As indicated, one side or edge of the part must be open or free so that the multipunch can be readily loaded and unloaded. This sometimes necessitates the use of two separate templates for the production of a single part.





Setup for three multipunch dies. If more than three dies are used in a single operation, it is not necessary to fasten the additional dies to the setup plate because the multipunch template will hold them in position.

fitted with a handle for insertion in the outside loops of these parts.

If necessary, old drill templates can be reworked so that they will serve as multipunch templates by enlarging their drilled holes until they conform with the dimensions of the tops of the required multipunch dies.

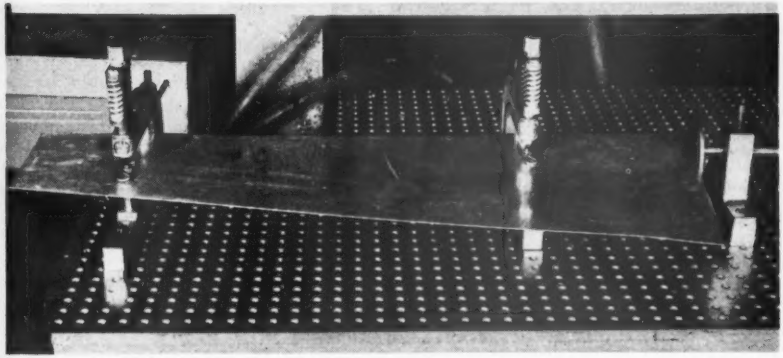
Consolidated Vultee's locating hole sizes and color code for the multipunch templates are as shown in the accompanying table.

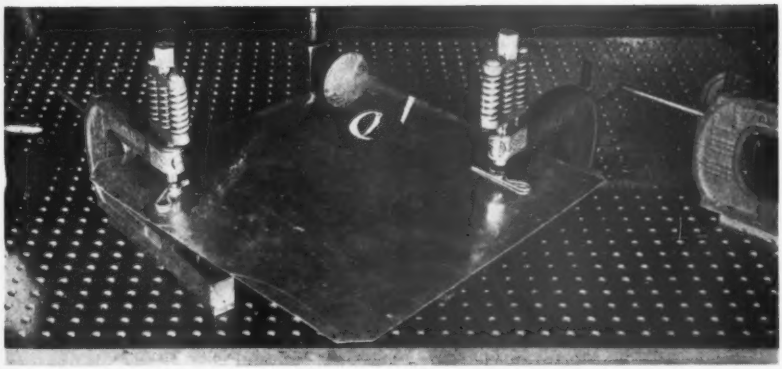
The spacing of the holes that can be punched while using multipunch templates may be as little as ¾", depending on the sizes of the multipunch dies, and the maximum distance from the edge of the part to the center line of a hole is 3½".

If all sides of a part must be punched, it may be necessary to make two multipunch templates for a single job because at least one side of the part must be open or free so that the tool can be

Nominal Size	Decimal Size	Multipunch Template Hole Size	Color Code
#39	0.099	0.372	Red
#30	0.128	0.372	White
#26	0.147	0.372	Orange
#20	0.161	0.372	Yellow
#18	0.169	0.372	Gray
#10	0.191	0.372	Blue
I	0.228	0.495	Black
F	0.257	0.495	Green
K	0.281	0.620	Pink
$\frac{A}{16}$	0.312	0.620	Silver

Here is a setup for two multipunch dies. Note the pin locks which hold the multipunch template in place.





Multipunch setups may be used when it is necessary to punch holes in opposite corners of four-sided parts. The multipunch template is made from .064" Dural.

loaded and unloaded before and after each operation. Further, if a single part must be punched twice, a locating plug (which contains a standard counterbore pilot) should be used. The pilot in the locating plug should match the punched holes in the part, while the plug shank should match the holes in the multipunch template.

Consolidated Vultee now utilizes the multipunch templates in connection with short production runs because they eliminate the need for expensive blank and pierce dies and difficult stack-drilling operations.

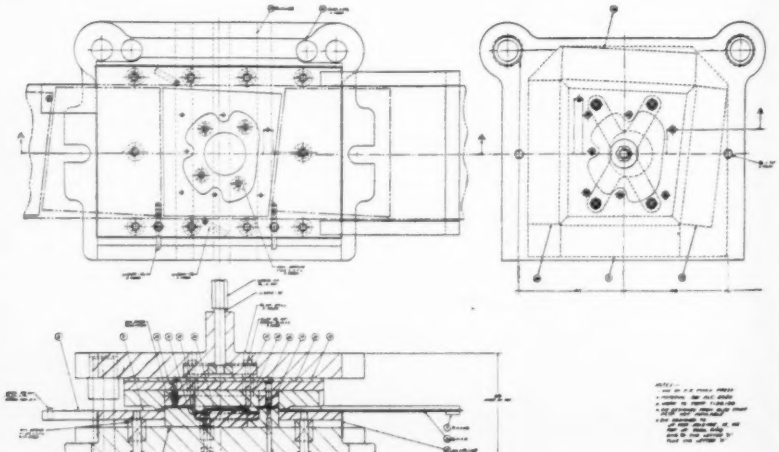
It has been found that the grinding of multipunch dies for this work does not alter the usefulness of the dies when other types of multipunch operations are necessary; and just because the same units can be employed for virtually every multipunch job, only a minimum amount of tool storage space is required and tool setup times are greatly reduced.

Shown in the accompanying drawing is the design of a blank and pierce die which will cause scrap slugs to shrink in the process of fabrication. It is estimated that designs like this will save approximately eight hours of time in the fabrication of each 1000 production parts with blank-pierce dies.

Improved Slug Ejection

An improved method for ejecting scrap slugs from blank-pierce dies and production parts has been developed by R. J. Knight, tool design supervisor for Consolidated Vultee Aircraft Corporation at San Diego, California. It can be used in connection with virtually all the subject dies which will not permit a positive knock-out.

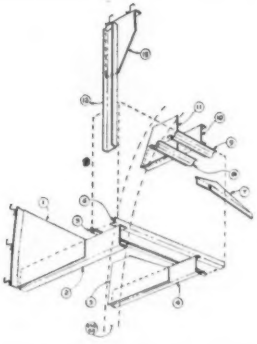
Before the new method was developed, it was customary to design blank and pierce or pierce dies so that a spring or rubber-mounted stripper could be used to compress the shedder. Therefore, when the ram ascended, the shedder would push scrap slugs back into the blanked opening in the production part from the die and extract the scrap slugs by means of a mallet or by hand, depending on how tightly the slugs were wedged in the part; and consequently, parts were sometimes bent out of shape.



The new method consists simply of designing the subject dies so that large scrap slugs will be shrunk in size, regardless of their shapes, during the process of fabrication. This causes the slugs to remain loose in the blanked openings, instead of being forced back into the production parts, when the shedder is elevated. The slugs can then be removed either by hand or by air blast.

Besides increasing the life of blank-pierce dies by reducing friction, the new method increases the salvage value of the subject tools by necessitating comparatively small holes in die shoes. Further, it has been found that the specially-designed dies require less spring or rubber pressure to actuate the shedder and that they will save approximately eight hours of time in the fabrication of each 1000 production parts.

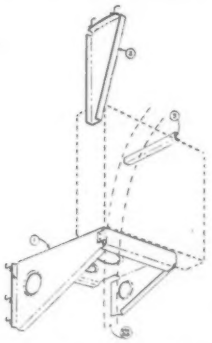
Design Simplification



An outstanding example of how Consolidated Vultee Aircraft Corporation engineers are currently saving production time and tools by simplifying their designs is given in the accompanying illustrations.

The upper illustration shows the conventional engineering design for an ammunition box support bracket in a large bomber. The program of operations and tools required by this design necessitated a total of 30 operations in which 45 tools were utilized.

Below is a drawing which shows the



simplified engineering design of the same part. The reduced operations and tooling required by the new design necessitated a total of but eight operations in which only 13 tools were utilized. The savings in the cost of tools and time can well be appreciated.

★

We cannot stretch our paper, but . . . we can supply you with mighty helpful information in booklet form. These booklets, supplementing many of the valuable articles already published on our pages, are useful sources of information to have in your home reference or shop file. For a complete list of available booklets, see page 84.

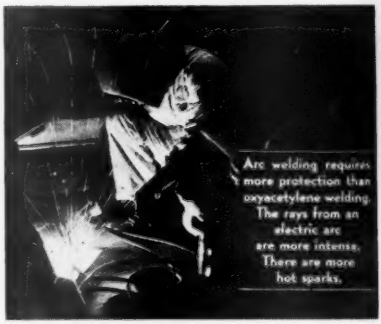
Visual Safety Training Aids

by Lyne S. Metcalfe

Intensification of safety education, and improvement of safety training methods in that field, has had a profound effect upon the conservation of manpower for the war production effort, and this has been particularly true in metal working shops. With so large a percentage of only partially or totally untrained personnel coming into the machine tool industry, the accident hazard curve naturally tends to swing upward.

There are, of course, numerous mediums and methods at the service of the industry for the efficient training of operatives in well established safety procedures in the workshop. Generally speaking, talks and demonstrations, exhibits and printed appeals have been widely used, and with success. Recently, however, there has been made available to the machine tool shop a series of eight discussional type slidefilms, "Basic Shop Safety", which provides, in condensed and visual form, many of the most successful working safety precautions and rules developed in war plants during the past three or four years.

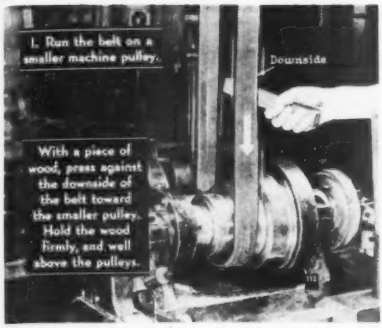
The visual medium, of course, especially in the form of the discussional slidefilm, has proved its efficiency in more quickly training in the "how it works-how to work it" crafts and skills, including machine shop work. Applied to safety education, it also offers foremen a simpler form of supplementary safety instruction, i.e., an organized course and an organized lesson. These films have been so planned and prepared that they may either be integrated with the shop's present safety education program or made the basis for such a program along the newest lines. These films also include certain new visual teaching techniques developed under wartime pressure to make the use of the medium more efficient and effectual.

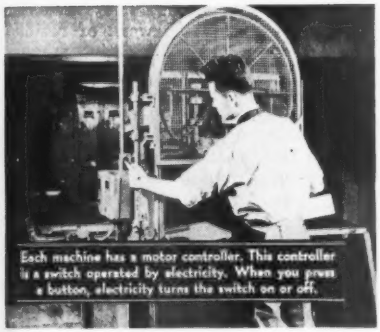

Arc welding requires more protection than oxyacetylene welding. The rays from an electric arc are more intense. There are more hot sparks.

For instance, each subject concludes with a review of the information presented before in that lesson, with a set of pointed test questions for the aid and convenience of foreman or instructor. Each lesson has been organized so that the various elements of the subject may be taught as separate lessons or sessions if desired. The eight films, in other words, comprise not only lesson plan, but, also the lessons. The subjects are as follows:

Play Safe and Work Safely

The workers share in shop safety, general safety in using tools and machines, shop conduct, connecting portable electrical appliances, lifting heavy objects, using ladders.


1. Run the belt on a smaller machine pulley.
Downside
With a piece of wood, press against the downside of the belt toward the smaller pulley. Hold the wood firmly, and well above the pulleys.


Each machine has a motor controller. This controller is a switch operated by electricity. When you press a button, electricity turns the switch on or off.

Maintaining A Safe Shop

Conditions that cause accidents, handling and storing materials, disposal of scrap material and wiping cloths, protruding nails.

Safety Inspection

Selecting an employee or student safety engineer, typical duties, shop hazards, getting cooperation from others, selling safety.

Training For Emergencies

Clothing caught in machine, location of emergency services, using a fire extinguisher, using a fire blanket, turning in a fire alarm, escape and rescue from a burning building, electric shock, escape and rescue, poisoning.

Treatment For Bleeding

Principles of first aid applied to common shop accidents, types of wounds, how to stop serious bleeding, treating for shock, preventing infection.

Aid For Injuries, Fainting, Burns

Bone and muscle injuries, eye injuries, burns, unconsciousness.

Eye Protection

Need, selection, use and care of safety goggles, welding goggles, hamlets, hand shields.

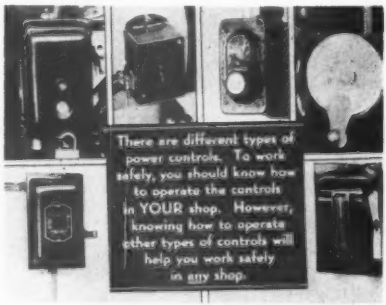
Power Supply

Starting and stopping machines wired independently of each other, machines wired through a disconnect switch, using motor controllers and emergency stop stations, changing speeds of machines, shifting V-belts, shifting overhead belts.

The discussional type of slidefilm is a strip of 35 mm safety motion picture film on each segment or frame of which is a picture, special photograph, drawing, chart or other pictorial device with legends, labels and letterings superimposed on the film to amplify the meaning and for the guidance of the instructor or meetings leader. Generally speaking, films of this type are used for the following purposes:

1. For pre-training in advance of actual bench or aisle experience, and preparatory for it.
2. As procedure patterns in tool shop for single operatives or operatives in groups.
3. As "refresher" teaching material.

In many war plants, teaching crafts and skills with the aid of this medium, as much as 40 percent of the time required to finish such a course as basic shop safety, has been saved.

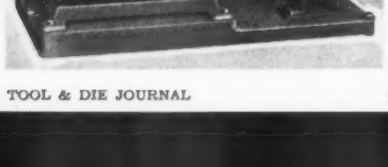

There are different types of power controls. To work safely, you should know how to operate the controls in YOUR shop. However, knowing how to operate other types of controls will help you work safely in any shop.

Demagnetizers - What They Accomplish

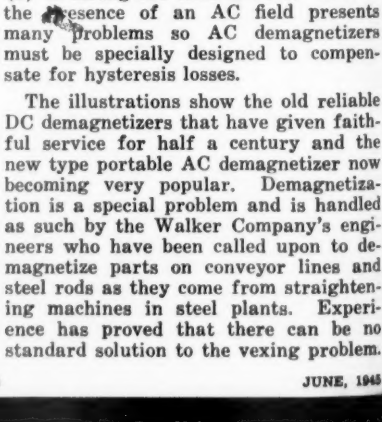
by Charles D. Briggs
CHIEF ENGINEER
O. S. Walker Company

The war effort has created broader uses for special magnetic chucks and magnetic holding devices. With greater use of magnetic force for all types of holding and chucking operations comes the associated problem of demagnetization.

Fundamentally, the part to be held becomes an important factor in the magnetic circuit and unless the work to be held becomes magnetized with a definite polarity relationship to the chuck or fixture it will not hold. Theoretically, when the magnetic field of the chuck collapses the magnetic lines of force in the work also collapse; practically, there is a lag between these two fields and when the field of the chuck reaches zero a lag or residual magnetism still remains in the work. In most instances, however, the field in the work is so small that the magnetism does not impede further production operations but in the event there remains sufficient magnetism in the work to cause trouble it becomes a problem of applying some external energy to rid the work of its magnetism. Normally, a piece of metal is non-magnetic when there is no continuity of magnetic effect in its ions; in other words, it's like a shallow pan of pumpkin seeds when the seeds point in all directions and are not systematically arranged. But a piece of steel becomes magnetized when the ions are arranged so that their poles add and they are in line, again like the pan of pumpkin seeds but with the seeds arranged in lines so that the tips are next to the bases.



When the field of the chuck collapses the field of the piece lags due to friction; in other words the "pumpkin seeds" do not readily go back into their original unorganized manner. Then the piece retains some residual magnetism. To get the pan of pumpkin seeds disorganized the pan is shaken by an external force. To rid the work of residual magnetism an external rotating magnetic field "shakes up" the ions. This is demagnetization and is accomplished by demagnetizers. The O. S. Walker Co., Inc., have been pioneers in the field and utilized two methods: (1) A constant DC field is rotated mechanically and



(2) A strong AC field is used. Iron in the presence of an AC field presents many problems so AC demagnetizers must be specially designed to compensate for hysteresis losses.

The illustrations show the old reliable DC demagnetizers that have given faithful service for half a century and the new type portable AC demagnetizer now becoming very popular. Demagnetization is a special problem and is handled as such by the Walker Company's engineers who have been called upon to demagnetize parts on conveyor lines and steel rods as they come from straightening machines in steel plants. Experience has proved that there can be no standard solution to the vexing problem.

Selecting The Motor For The Application

by J. M. Stein
MOTOR ENGINEERING DEPARTMENT
and G. A. Caldwell
INDUSTRY ENGINEERING DEPARTMENT
Westinghouse Electric Corporation
East Pittsburgh, Pennsylvania

There was a time when machinery electrification meant using a single motor to drive a machine instead of taking power from a lineshaft or some other prime mover. However, we have now reached the time when machinery electrification means much more. A single motor driving a complete machine is now the exception rather than the rule, and on the larger and more complicated machines 5 to 10 motors are not uncommon. The correct application of these motors as well as the associated control equipment and other auxiliary electrical devices to give the desired sequence of operation by means of complete cooperation between the electrical manufacturer and machinery builder is machinery electrification in the full sense of the word.

As a machine is simplified mechanically by applying motors to perform the various functions of the machine, it is quite logical to expect the motor to go through cycles of operation that have in the past been obtained by means of clutches, gear changing mechanisms, or other mechanical and hydraulic devices. Where a wide range in speed is required, various forms of adjustable voltage drives making use of D-C motors, motor generator sets, or electronic rectifiers have been successfully applied. Many papers have been presented recently in regard to what can be done with wide speed range adjustable voltage drives of various types, and undoubtedly this phase will be covered further in papers to be presented at this conference. However, there are many applications where a wide range in speed is not required, and it is desirable to consider what can be accomplished with the simpler electrical drives.

It is really surprising what can be done with our simplest and most reliable type—the squirrel cage induction motor. The primary purpose of presentation talk is to summarize its characteristics and to make sure we do not overlook its possibilities.

A few years ago the electrical manufacturers' catalog covering squirrel cage induction motors was a simple listing of motor ratings and speeds, and with

Speed-torque characteristic of general purpose induction motor with squirrel cage winding of straight copper bars connected to resistance rings, Curve 1. Curves 2 and 3 are torque characteristics resulting with rotor windings of brass or bronze or other high resistant alloys.

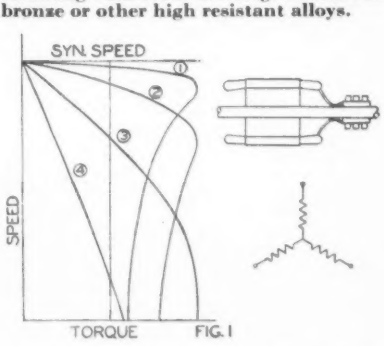
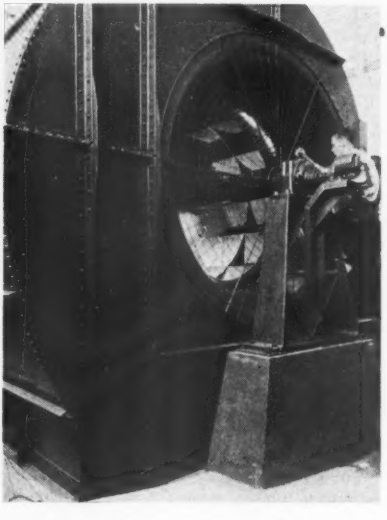


FIG. 1

practically no electrical or mechanical modifications available. The motor was apt to have a starting torque not much more than full load torque, high starting current, and it was assumed that this motor was suitable only for applications where the motor was started infrequently and ran continuously in one direction at a nearly constant load.



Excess thermal capacity is provided in this Westinghouse induction motor to keep the temperature rise within acceptable limits during acceleration of a high inertia fan load.

Today, so many different types of squirrel cage motors are available that the question is usually not whether a suitable motor for an application is available but which one of several available ones should be used. For instance, NEMA has recognized and defined six classes of motor in regard to the speed-torque curve of the motor alone. When all of these speed-torque characteristics are combined with such features as the time and temperature ratings, types of enclosures and other special mechanical features, there are literally thousands of combinations that can be specified. Most manufacturers list motors on the basis of the various speed-torque characteristics standardized by NEMA, and in addition list motors that have been specially designed for such applications as elevators, hoists, presses, and extractors to mention only a few. Yet with all of these hundreds of combinations the basic design of the motor is the same in regard to its electrical characteristics, and it is the most widely used motor that we have today.

As we all know, a squirrel cage induction motor is essentially a constant speed motor. However, this motor must be started and stopped, and in many cases reversed. The conditions in the motor while starting, stopping, and reversing are entirely different from those when it is running at its normal speed, and the combination of these conditions is what is generally called the duty cycle.

Once the duty cycle that the motor must meet has been determined, it is possible to determine the relative motor losses for the various portions of the cycle and also to control these losses by proper motor design to obtain the most efficient overall characteristics. How the motor characteristics can be

Speed-torque characteristic of general purpose induction motor.

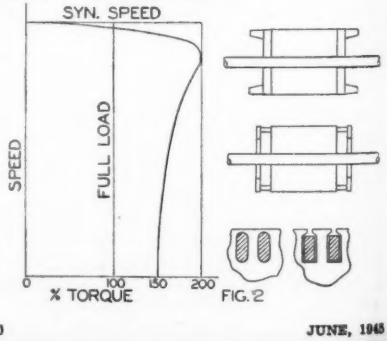


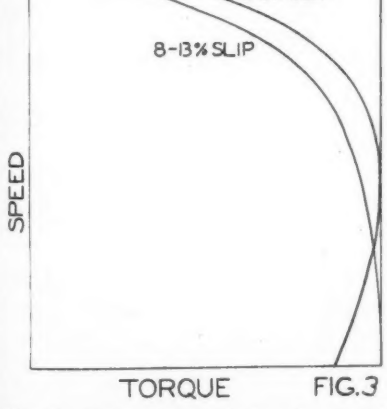
FIG. 2

varied to meet the different duty cycles to the best advantage will now be described.

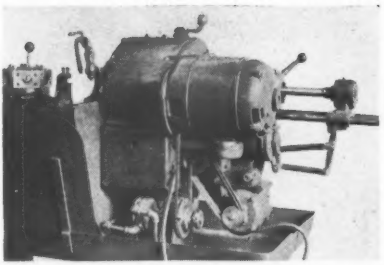
The most common way to vary the speed-torque characteristic of an induction motor is by varying the rotor resistance. To use this means to the greatest advantage a wound rotor induction motor is quite frequently used and different characteristics obtained by varying an external resistor connected in the rotor circuit. Typical speed-torque curves of a wound rotor induction motor with varying amounts of secondary resistance are shown in Figure 1, and the number of curves that can be obtained is limited only by the number of resistance points available.

For many applications, a single characteristic is sufficient, and it is not necessary to vary the rotor resistance. In this case rather than winding the rotor with phase windings it is much more economical to build the squirrel cage winding which consists of straight bars distributed around the rotor periphery and connected on the two ends with resistance rings. This rotor is almost a solid mass of metal and is practically indestructible.

The most common of the squirrel cage induction motors is the general purpose motor or NEMA Class A having a speed-



Speed-torque characteristic of general purpose induction motor with special rotor for punch press or hoist operation.



Power for the spindle of this Bardons & Oliver turret lathe is furnished by a Westinghouse reversing, two-speed induction motor.

torque characteristic similar to curve No. 1 of Figure 1. On the basis of rated torque, the starting torque is approximately 150% and the maximum torque approximately 200%. The slip at full load is less than 5% and the locked current is approximately 650%. The relative shape of the curve is shown in Figure 2. This type of motor has a high running efficiency and is applicable to continuous loads where the motor is not subject to frequent starts on a system of high inertia.

The squirrel cage winding of the general purpose induction motor is generally built of copper bars and resistance rings or as a die casting of aluminum. When a torque characteristic such as shown in Figure 1, curves No. 2 and No. 3, is desired, the rotor winding is constructed of brass or bronze or other high resistance alloys, or cast of various aluminum alloys. The characteristics are shown in Figure 3. These rotors are used in motors for hoist, shear, and press applications. The types considered standard usually fall in three categories: (1) The punch press motor with 5-8% slip. (2) The punch press motor with 8-13% slip, and (3) the hoist motor usually having slips about the same as (2) but with an intermittent time-temperature rating using a smaller frame size than the comparable general purpose motor of the same horsepower rating. These motors are included in NEMA Class D. The maximum torque of the higher slip machines is usually developed at zero speed and is 250 to 300% of rated torque. Because of the higher slip and lower efficiency this

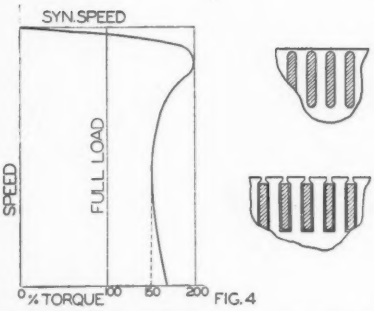


FIG. 4

Speed-torque characteristic of induction motor with rotor slotted to accommodate extra deep bars.

characteristic is not usually used for motors running continuously at full load.

There are motors developed especially for low starting current requirements which must rely on means other than secondary resistance to obtain high torque per unit current. The most popular motor in this class is the Class 1 motor (NEMA Class B) which uses a rotor construction which incorporates deeper bars than the general purpose motor. The increased depth of bar causes the current to crowd toward the top; this crowding increasing with rotor frequency. Since the rotor frequency is higher under locked conditions than under running conditions, the apparent resistance of the rotor is higher, resulting in increased starting torque per unit current. Hence we have characteristics in the running region approaching those of the general purpose motor and approaching those of the high slip motor under locked conditions. The speed torque characteristics of this type of motor are shown in Figure 4. The maximum and starting torques are approximately the same for the general purpose motor, but the locked current is reduced considerably.

The crowding of current to the top of the bar may become more effective if the top of the bar has a higher resistance and may be increased further by allowing a flux leakage path between the upper and lower parts. This is exactly what is done in the Class 2 motor (NEMA Class C) which is built with a double deck rotor. The characteristics of this motor are shown in Figure 5.

The top bar and ring are generally of smaller cross section and higher resistivity than the lower bar and ring. The Class 2 motor has a 200% starting torque, 180% pull-out torque, and starting currents of the same magnitude as the Class 1 motor. With reduced voltage starting it is possible to obtain a further reduction in starting current without risking a low torque. Let us emphasize the point that the Class 2 motor was designed primarily as a means of obtaining low starting currents and not as a motor for high torque applications.

From the foregoing description of motor construction and performance, we may conclude that the application of the motors to continuous loads is chiefly dependent upon running efficiency considerations. While the torque characteristics are changed to produce the necessary starting torque with reduced starting currents, no particular consideration is given to the losses in the motor under starting conditions.

When an induction motor is connected to a load of high moment of inertia and with frequent starting and stopping, we must consider the amount of heat generated in the various members as the motor changes in speed. The rate of acceleration of the load is proportional to the available torque of the motor and inversely proportional to moment of inertia of the system. This results in a time of acceleration which is shorter the higher the available torque. From our consideration of torque for various rotor resistances, we see that the power dissipated in the rotor is higher for the higher resistance. Since the total heat-

(TO PAGE 126—PLEASE)

Speed-torque characteristic of induction motor with double deck rotor.

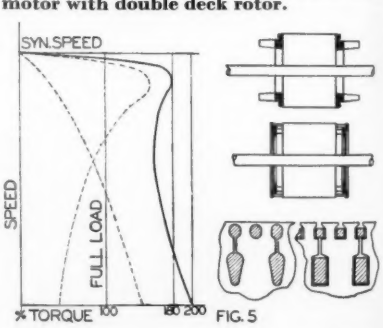


FIG. 5

MATERIALS WEIGHT TABLES • SUPPLEMENT • BAR STOCK

Weight in pounds per inch / pounds per foot of cold rolled steel (1 cu. inch = .2836 lb.)

SIZE	ROUND	SQUARE	HEXAGON
1/64	.000057 .00068	.000068 .00082	.000059 .00071
1/32	.00023 .00272	.00028 .00334	.00024 .00289
3/64	.00049 .00587	.00062 .00749	.00054 .00648
1/16	.00088 .01055	.00111 .01331	.00096 .01152
5/64	.00136 .01629	.00173 .02076	.00150 .01798
3/32	.00196 .02347	.00249 .02991	.00216 .02591
7/64	.00266 .03190	.00339 .04070	.00294 .03525
1/8	.00349 .04186	.00443 .05316	.00384 .04604
9/64	.00440 .05284	.00561 .06732	.00486 .05829
5/32	.00544 .06534	.00692 .08307	.00600 .07194
11/64	.00658 .07895	.00838 .10053	.00726 .08706
3/16	.00783 .09392	.00997 .11966	.00864 .10362
13/64	.00919 .11029	.01170 .14042	.01013 .12160
7/32	.01066 .12792	.01357 .16284	.01175 .14102
15/64	.01223 .14676	.01558 .18694	.01349 .16189
1/4	.01392 .16704	.01773 .21270	.01535 .18420
17/64	.01572 .18864	.02001 .24013	.01733 .20795
9/32	.01761 .21132	.02243 .26919	.01943 .23312
19/64	.01963 .23556	.02499 .29992	.02164 .25974
5/16	.02175 .26102	.02770 .33236	.02398 .28782
21/64	.02398 .28779	.03054 .36642	.02644 .31732

SIZE	ROUND	SQUARE	HEXAGON
11/32	.02632 .31582	.03351 .40212	.02902 .34825
23/64	.02877 .34519	.03663 .43952	.03172 .38062
3/8	.03134 .07605	.03988 .47856	.03454 .41444
25/64	.03397 .40784	.04327 .51929	.03747 .44970
13/32	.03675 .44105	.04681 .56166	.04053 .48639
27/64	.03964 .47570	.05048 .60570	.04371 .52454
7/16	.04262 .51150	.05428 .65141	.04701 .56411
29/64	.04573 .54980	.05823 .69875	.05043 .60512
15/32	.04895 .58739	.06232 .74779	.05397 .64759
31/64	.05226 .62711	.06654 .79846	.05762 .69146
1/2	.05570 .66839	.07090 .85080	.06140 .73679
33/64	.05922 .71062	.07540 .90481	.06530 .78355
17/32	.06287 .75449	.08004 .96049	.06931 .83178
35/64	.06661 .79938	.08482 1.0178	.07345 .88139
9/16	.07047 .84569	.08973 1.0768	.07771 .93251
37/64	.07444 .89334	.09479 1.1375	.08209 .98502
19/32	.07853 .94235	.09998 1.1998	.08658 1.0390
39/64	.08271 .99254	.10531 1.2637	.09120 1.0944
5/8	.08701 1.0441	.11078 1.3294	.09594 1.1512
41/64	.09141 1.0969	.11639 1.3967	.10079 1.2095
21/32	.09591 1.1509	.12214 1.4656	.10577 1.2692

MATERIALS WEIGHT TABLES • SUPPLEMENT • BAR STOCK

Weight in pounds per inch / pounds per foot of cold rolled steel (1 cu. inch = .2836 lb.)

SIZE	ROUND	SQUARE	HEXAGON
43/64	.10035 1.2066	.12802 1.5365	.11087 1.3304
11/16	.10527 1.2633	.13405 1.6086	.11608 1.3930
45/64	.11012 1.3214	.14021 1.6825	.12142 1.4570
23/32	.11506 1.3807	.14651 1.7581	.12688 1.5225
47/64	.12012 1.4415	.15295 1.8354	.13245 1.5894
3/4	.12529 1.5035	.15953 1.9143	.13815 1.6578
49/64	.13056 1.5668	.16624 1.9949	.14396 1.7276
25/32	.13596 1.6315	.17310 2.0771	.14990 1.7988
51/64	.14144 1.6973	.18009 2.1611	.15596 1.8715
13/16	.14705 1.7646	.18722 2.2467	.16213 1.9331
53/64	.15275 1.8330	.19449 2.3339	.16843 2.0211
27/32	.15856 1.9027	.20190 2.4228	.17484 2.0981
55/64	.16450 1.9740	.2945 2.5134	.18158 2.1766
7/8	.17053 2.0463	.21713 2.6056	.18804 2.2564
57/64	.17668 2.1202	.22495 2.6995	.19481 2.3377
29/32	.18292 2.1951	.23292 2.7950	.28171 2.4205
59/64	.18929 2.2715	.24102 2.8922	.20872 2.5047
15/16	.19577 2.3492	.24926 2.9911	.21586 2.5903
61/64	.20235 2.4281	.25764 3.0916	.22311 2.6714
31/32	.20904 2.5085	.26615 3.1938	.23049 2.7658
63/64	.21583 2.5899	.27481 3.2977	.23798 2.8558

SIZE	ROUND	SQUARE	HEXAGON
1	.22274 2.6729	.28356 3.4028	.24560 2.9472
1 1/64	.22975 2.7571	.29253 3.5104	.25333 3.0400
1 1/32	.23688 2.8426	.30161 3.6193	.26119 3.1342
1 3/64	.24410 2.9292	.31083 3.7299	.26916 3.2299
1 1/16	.25144 3.0173	.32016 3.8419	.27726 3.3271
1 5/64	.25891 3.1069	.32966 3.9559	.28547 3.4257
1 3/32	.26646 3.1975	.33927 4.0712	.29381 3.5257
1 7/64	.27412 3.2895	.34903 4.1883	.30226 3.6271
1 1/8	.28190 33828	.35892 4.3071	.31083 3.7299
1 9/64	.28978 3.4774	.36896 4.4276	.31953 3.8344
1 5/32	.29778 3.5734	.37914 4.5497	.32835 3.9402
1 11/64	.30589 3.6707	.38947 4.6736	.33729 4.0474
1 3/16	.31409 3.7690	.39993 4.7992	.34633 4.1560
1 13/64	.32242 3.8691	.41051 4.9261	.35547 4.2657
1 7/32	.33085 3.9702	.42126 5.0551	.36479 4.3775
1 15/64	.33938 4.0726	.43212 5.1856	.37421 4.4905
1 1/4	.34803 4.1764	.44313 5.3175	.38374 4.6049
1 17/64	.35680 4.2816	.45427 5.4512	.39341 4.7209
1 9/32	.36565 4.3877	.46556 5.5867	.40317 4.8380
1 19/64	.37461 4.4957	.47699 5.7238	.41306 4.9568
1 5/16	.38371 4.6045	.48856 5.8627	.42307 5.0769

MATERIALS WEIGHT TABLES • SUPPLEMENT • BAR STOCK

Weight in pounds per inch / pounds per foot of cold rolled steel (1 cu. inch = .2836 lb.)

63/64	.21583 2.5879	.27481 3.2977	.23798 2.8538
1	.22054 2.6444	.28081 3.3677	.24318 2.9163

1 1/64	.37957	.48337 5.7238	.41856 4.9568
1 1/16	.38371 4.6045	.48856 5.8627	.42307 5.0769

MATERIALS WEIGHT TABLES • SUPPLEMENT • BAR STOCK

Weight in pounds per inch / pounds per foot of cold rolled steel (1 cu. inch = .2836 lb.)

SIZE	ROUND	SQUARE	HEXAGON
21/64	.39290 4.7148	.50024 6.0029	.43323 5.1987
11/32	.40220 4.8264	.51210 6.1452	.44347 5.3216
23/64	.41159 4.9391	.52406 6.2888	.45385 5.4461
3/8	.42112 5.0534	.53617 6.4341	.46434 5.5721
25/64	.43073 5.1688	.54843 6.5811	.47494 5.6993
13/32	.44046 5.2855	.56082 6.7298	.48567 5.8280
27/64	.45030 5.4036	.57335 6.8802	.49653 5.9583
7/16	.46028 5.5234	.58603 7.0324	.50750 6.0900
29/64	.47032 5.6439	.59885 7.1862	.51859 6.2231
15/32	.48050 5.7660	.61178 7.3414	.52982 6.3529
31/64	.49077 5.8892	.62488 7.4986	.54114 6.4936
1/2	.50118 6.0141	.63810 7.6572	.55259 6.6311
33/64	.51164 6.1397	.65146 7.8175	.56417 6.7700
17/32	.5225 6.2670	.66496 7.9795	.57585 6.9102
35/64	.53297 6.3956	.67869 8.1432	.58768 7.0521
9/16	.54380 6.5256	.69238 8.3086	.59962 7.1954
37/64	.55472 6.6566	.70631 8.4757	.61167 7.3400
19/32	.56575 6.7890	.72034 8.6441	.62393 7.4860
39/64	.57693 6.9231	.73455 8.8146	.63611 7.6334
5/8	.58816 7.0579	.74887 8.9865	.64854 7.7824
41/64	.59956 7.1947	.76337 9.1604	.66107 7.9329

SIZE	ROUND	SQUARE	HEXAGON
21/32	.61102 7.3322	.77797 9.3357	.67372 8.0846
43/64	.62259 7.4710	.79272 9.5126	.68646 8.2378
11/16	.63427 7.6113	.80761 9.6913	.69939 8.3926
45/64	.64607 7.7528	.82261 9.8713	.7237 8.5485
23/32	.65801 7.8961	.83778 10.053	.72553 8.7064
47/64	.67003 8.0404	.85310 10.237	.73878 8.8653
3/4	.68214 8.1857	.86853 10.422	.75214 9.0256
49/64	.69436 8.3324	.88409 10.609	.76563 9.1876
25/32	.70677 8.4808	.89963 10.798	.77925 9.3510
51/64	.71918 8.6302	.91569 10.988	.79297 9.5157
13/16	.73174 8.7809	.93168 11.180	.80631 9.6818
53/64	.74439 8.9327	.94779 11.373	.82080 9.8495
27/32	.75718 9.0862	.96407 11.569	.83469 10.019
55/64	.77004 9.2410	.98047 11.766	.84910 10.189
7/8	.78308 9.3969	.99702 11.964	.86342 10.361
57/64	.79618 9.5541	1.0137 12.165	.87788 10.535
29/32	.80939 9.7127	1.0305 12.367	.89246 10.710
59/64	.82269 9.8724	1.0475 12.570	.90715 10.886
15/16	.83614 10.034	1.0646 12.775	.92196 11.063
61/64	.84969 10.196	1.0818 12.982	.93687 11.242
31/32	.86334 10.360	1.0992 10.191	.95193 11.423

MATERIALS WEIGHT TABLES • SUPPLEMENT • BAR STOCK

Weight in pounds per inch / pounds per foot of cold rolled steel (1 cu. inch = .2836 lb.)

SIZE	ROUND	SQUARE	HEXAGON
1 63/64	.87709 10.525	1.1167 13.401	.96710 11.605
2	.89096 10.691	1.1344 13.613	.98239 11.789
2 1/32	.91901 11.028	1.1701 14.042	1.0133 12.160
2 1/16	.94251 11.370	1.2064 14.477	1.0448 12.537
2 3/32	.97643 11.717	1.2432 14.919	1.0767 12.920
2 1/8	1.0058 12.070	1.2806 15.367	1.1090 13.308
2 5/32	1.0356 12.427	1.3186 15.823	1.1419 13.703
2 3/16	1.0659 12.790	1.3571 16.285	1.1752 14.103
2 7/32	1.0965 13.158	1.3961 16.754	1.2090 14.509
2 1/4	1.1276 13.531	1.4357 17.229	1.2433 14.920
2 9/32	1.1592 13.910	1.4759 17.711	1.2781 15.338
2 5/16	1.1911 14.293	1.5166 18.199	1.3134 15.761
2 11/32	1.2235 14.682	1.5579 18.694	1.3490 16.188
2 3/8	1.2564 15.077	1.5997 19.196	1.3853 16.624
2 13/32	1.2897 15.476	1.6420 19.705	1.4220 17.064
2 7/16	1.3227 15.873	1.6850 20.220	1.4592 17.510
2 15/32	1.3575 16.290	1.7285 20.741	1.4968 17.962
2 1/2	1.3921 16.705	1.7725 21.270	1.5350 18.420
2 17/32	1.4271 17.126	1.8171 21.805	1.5736 18.883
2 9/16	1.4626 17.551	1.8622 22.347	1.6127 19.352
2 19/32	1.4985 17.982	1.9079 22.895	1.6523 19.827

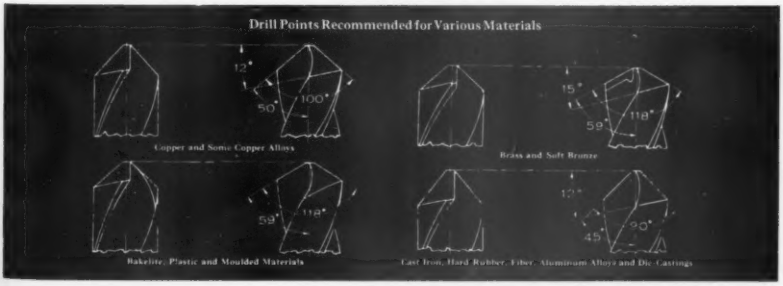
SIZE	ROUND	SQUARE	HEXAGON
2 5/8	1.5348 18.418	1.9542 23.450	1.6923 20.308
2 21/32	1.5716 18.859	2.0010 24.012	1.7329 20.794
2 11/16	1.6088 19.305	2.0484 24.580	1.7739 21.286
2 23/32	1.6464 19.757	2.0963 25.155	1.8154 21.784
2 3/4	1.6845 20.214	2.1447 25.737	1.8573 22.288
2 25/32	1.7230 20.676	2.1938 26.325	1.8998 22.797
2 13/16	1.7619 21.143	2.2433 26.920	1.9427 23.313
2 27/32	1.8013 21.615	2.2934 27.521	1.9861 23.834
2 7/8	1.8411 22.093	2.3441 28.129	2.0300 24.360
2 29/32	1.8813 22.576	2.3954 28.744	2.0744 24.893
2 15/16	1.9220 23.064	2.4472 29.366	2.1192 25.431
2 31/32	1.9631 23.557	2.4995 29.994	2.1646 25.975
3	2.0047 24.056	2.5524 30.629	2.2104 26.525
3 1/16	2.0891 25.069	2.6499 31.798	2.3034 27.641
3 1/8	2.1752 26.102	2.7695 33.234	2.3984 28.781
3 3/16	2.2631 27.157	2.8814 34.577	2.4953 29.944
3 1/4	2.3527 28.232	2.9957 35.948	2.5941 31.129
3 5/16	2.4440 29.328	3.1119 37.343	2.6949 32.339
3 3/8	2.5371 30.446	3.2305 38.766	2.7975 33.570
3 7/16	2.6320 31.584	3.3510 40.212	2.9021 34.825
3 1/2	2.7295 32.743	3.4741 41.689	3.0087 36.105

EQUIVALENT DRILL SIZES

Fraction and No.	Decimal	Metric
	.0039	.10
	.0059	.15
	.0079	.20
	.0098	.25
	.0118	.30
80	.0135	
	.0138	.35
79	.0145	
1/64	.0156	
	.0157	.40
78	.0160	
	.0177	.45
77	.0180	
	.0197	.50
76	.0200	
75	.0210	
	.0217	.55
74	.0225	
	.0236	.60
73	.0240	
72	.0250	
	.0256	.65
71	.0260	
	.0276	.70
70	.0280	
69	.0292	
	.0295	.75
68	.0310	
1/32	.0312	
	.0315	.80
67	.0320	
66	.0330	
	.0335	.85
65	.0350	
	.0354	.9
64	.0360	
63	.0370	
	.0374	.95
62	.0380	
61	.0390	
	.0394	1.00
60	.0400	
59	.0410	
	.0413	1.05
58	.0420	
57	.0430	
	.0433	1.10
	.0453	1.15
56	.0465	
3/64	.0469	
	.0472	1.20
	.0492	1.25
	.0512	1.30
55	.0520	
	.0531	1.35
54	.0550	
	.0551	1.40
	.0571	1.45
	.0591	1.50

Fraction and No.	Decimal	Metric
53	.0595	
	.0610	1.55
1/16	.0625	
	.0630	1.60
52	.0635	
	.0650	1.65
	.0669	1.70
51	.0670	
	.0689	1.75
50	.0700	
	.0709	1.80
	.0728	1.85
49	.0730	
	.0748	1.90
48	.0760	
	.0768	1.95
5/64	.0781	
47	.0785	
	.0787	2.00
	.0807	2.05
46	.0810	
45	.0820	
	.0827	2.10
	.0846	2.15
44	.0860	
	.0866	2.20
	.0886	2.25
43	.0890	
	.0906	2.30
	.0925	2.35
42	.0935	
3/32	.0938	
	.0945	2.40
41	.0960	
	.0965	2.45
40	.0980	
	.0984	2.50
39	.0995	
38	.1015	
	.1024	2.60
37	.1040	
	.1063	2.70
36	.1065	
7/64	.1094	
35	.1100	
	.1102	2.80
34	.1110	
33	.1130	
	.1142	2.90
32	.1160	
	.1181	3.00
31	.1200	
	.1220	3.10
1/8	.1250	
	.1260	3.20
	.1280	3.25
30	.1285	
	.1299	3.30
	.1339	3.40

Fraction and No.	Decimal	Metric
29	.1360	
	.1378	3.50
28	.1405	
9/64	.1406	
	.1417	3.60
27	.1440	
	.1457	3.70
26	.1470	
	.1476	3.75
25	.1495	
	.1496	3.80
24	.1520	
	.1535	.390
23	.1540	
5/32	.1562	
22	.1570	
	.1575	4.00
21	.1590	
20	.1610	
	.1614	4.10
	.1654	4.20
19	.1660	
	.1673	4.25
	.1693	4.30
18	.1695	
11/64	.1719	
17	.1730	
	.1732	4.40
16	.1770	
	.1772	4.50
15	.1800	
	.1811	4.60
14	.1820	
13	.1850	4.70
	.1870	4.75
3/16	.1875	
12	.1890	4.80
11	.1910	
	.1929	4.90
10	.1935	
9	.1960	
	.1968	5.00
8	.1990	
	.2008	5.10
7	.2010	
13/64	.2031	
6	.2040	
	.2047	5.20
5	.2055	
	.2067	5.25
	.2087	5.30
4	.2090	
	.2126	5.40
3	.2130	
	.2165	5.50
7/32	.2187	



EQUIVALENT DRILL SIZES

Fraction No. and Letter	Decimal	Metric
7/32	.2187	
	.2205	*5.6*
2	.2210	
	.2244	*5.7*
	.2264	*5.75*
1	.2280	
	.2283	*5.8*
	.2323	*5.9*
A	.2340	
15/64	.2344	
	.2362	*6.0*
B	.2380	
	.2402	*6.1*
C	.2420	
	.2441	*6.2*
D	.2460	
	.2461	*6.25*
	.2480	*6.3*
1/4	.2500	
E	.2500	
	.2520	*6.4*
	.2559	*6.5*
F	.2570	
	.2598	*6.6*
G	.2610	
	.2638	*6.7*
16/64	.2656	
	.2657	*6.75*
H	.2660	
	.2677	*6.8*
	.2717	*6.9*
I	.2720	
	.2756	*7.0*
J	.2770	
	.2795	*7.1*
K	.2810	
9/32	.2812	
	.2835	*7.2*
	.2854	*7.25*
	.2874	*7.3*
L	.2900	
	.2913	*7.4*
M	.2950	
	.2953	*7.5*
19/64	.2969	
	.2992	*7.6*
N	.3020	
	.3031	*7.7*
	.3051	*7.75*
	.3071	*7.8*
	.3110	*7.9*
5/16	.3125	
	.3150	*8.0*
O	.3160	
	.3189	*8.1*

Fraction No. and Letter	Decimal	Metric
	.3228	*8.2*
P	.3230	
	.3248	*8.25*
	.3268	*8.3*
21/64	.3281	
	.3307	*8.4*
Q	.3320	
	.3346	*8.5*
	.3386	*8.6*
R	.3390	
	.3425	*8.7*
11/32	.3437	
	.3445	*8.75*
	.3465	*8.8*
S	.3480	
	.3504	*8.9*
	.3543	*9.0*
T	.3580	
	.3583	*9.1*
23/64	.3594	
	.3622	*9.2*
	.3642	*9.25*
	.3661	*9.3*
U	.3680	
	.3701	*9.4*
	.3740	*9.5*
3/8	.3750	
V	.3770	
	.3780	*9.6*
	.3819	*9.7*
	.3839	*9.75*
	.3858	*9.8*
W	.3860	
	.3898	*9.9*
25/64	.3906	
	.3937	*10.0*
X	.3970	
Y	.4040	
13/32	.4062	
Z	.4130	
	.4134	*10.5*
27/64	.4219	
	.4331	*11.0*
7/16	.4375	
	.4527	*11.5*
29/64	.4531	
15/32	.4687	
	.4724	*12.0*
31/64	.4844	
	.4921	*12.5*
1/2	.5000	
	.5118	*13.0*
33/64	.5156	
17/32	.5312	
	.5315	*13.5*

Fraction No. and Letter	Decimal	Metric
35/64	.5469	
	.5512	*14.0*
9/16	.5625	
	.5709	*14.5*
37/64	.5781	
	.5905	*15.0*
19/32	.5937	
39/64	.6094	
	.6102	*15.5*
5/8	.6250	
	.6299	*16.0*
41/64	.6406	
	.6496	*16.5*
21/32	.6562	
	.6693	*17.0*
43/64	.6719	
11/16	.6875	
	.6890	*17.5*
45/64	.7031	
	.7087	*18.0*
23/32	.7187	
	.7283	*18.5*
47/64	.7344	
	.7480	*19.0*
3/4	.7500	
49/64	.7656	
	.7677	*19.5*
25/32	.7812	
	.7874	*20.0*
51/64	.7969	
	.8071	*20.5*
13/16	.8125	
	.8268	*21.0*
53/64	.8281	
27/32	.8437	
	.8464	*21.5*
55/64	.8594	
	.8661	*22.0*
7/8	.8750	
	.8858	*22.5*
57/64	.8906	
	.9055	*23.0*
29/32	.9062	
59/64	.9219	
	.9252	*23.5*
15/16	.9375	
	.9449	*24.0*
61/64	.9531	
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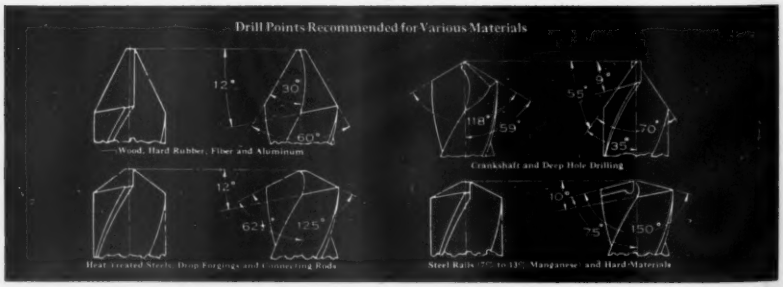
	.9842	*25.0*
63/64	.9844	
1	1.0000	



INDUSTRIAL PLASTICS

This is the final appearance of the above heading in *Tool & Die Journal.*

Industrial Plastics had its origin in these pages about five years ago as a department featuring the design, manufacture and use of plastics tooling and processing equipment. This was popular from the first with those *Tool & Die Journal* readers whose activities were beginning to include plastics.

As the department grew, more and more men whose primary interests lay in the plastics field were added to the *Tool & Die Journal* circulation. Also, numerous requests were received for expansion of the *Industrial Plastics* department.

Tool & Die Journal is devoted to the precision metalworking industries and there was a definite limit to the amount of space which could be appropriately allocated to plastics. Hence, the decision to take the department out of *Tool & Die Journal* and establish *Industrial Plastics* as a magazine in its own right, to be devoted editorially to timely, authoritative material on plastics processing, fabricating and finishing and new developments in tools, equipment and accessories for plastics working.

Tool & Die Journal readers whose activities are particularly concerned with plastics may be eligible to receive *Industrial Plastics.*

While initially the circulation of *Industrial Plastics* is limited, *Tool & Die Journal* readers who wish to qualify are invited to write indicating the phase of plastics tooling or production in which they are engaged. Address:

INDUSTRIAL PLASTICS

2460 Fairmount Boulevard

Cleveland 6, Ohio

A HUEBNER PUBLICATION

Contract Placed for Giant Clippers

Two B-24 liberators standing side by side with ten feet between their wing tips would merely equal the span of the Vultee Model 37, a mock-up of which is pictured above. Pan American World Airways confirm the fact that a contract for a fleet of these planes has been placed with Consolidated Vultee Aircraft Corporation.

The giant 204-passenger land based clipper is 182 feet long and has a wing span of 230 feet. The engines are mounted on the trailing edge of the wing, and equipped with pusher type propellers. Cruising speeds will vary between 310 and 342 miles per hour; the New York to London trip will take about nine hours, and other schedules will be proportionately fast. For the public, the enormous capacity and the high speed of the new clippers will mean unprecedented low fares on transoceanic and possibly transcontinental travel. The weight and size of the new clipper have been considered in designing several of the great new airports, such as the one at Idlewood, New York. Pan American is seeking authority to include Chicago, Detroit, Baltimore and Boston as transatlantic coterminals. In the winter season the units not required on the North Atlantic would be available for regular service over Pan American's trunk line route to Latin America.

Although production cannot be started until wartime restrictions have been removed, a full scale model of the clipper has been completed, and more than 90 percent of the initial engineering work has been finished.

Splash Curtains Prevent Accidents

A large sheet of Compar, a vinyl resin derivative that is entirely immune to oils and solvents, forms the splash curtain illustrated below. This flexible, rubber-like synthetic, developed by Resistoflex Corporation, Belleville, N. J., is completely transparent, so that machine performance is visible at all times, but the operator is protected from the

danger and discomfort caused by splashing of oil or solvents on skin, clothing and floor. Constant cleaning of oil-soaked floors, and attendant slippage and fire hazards are also eliminated.

Where hydraulic fluids are carried under great pressure, the curtains are especially advantageous, since the great tensile strength of the Compar protects workers from the impact of the high pressure fluid when hose line breaks occur.

The flexibility of Compar makes possible the tailoring of splash curtains to order for any type of machine, giving complete protection, particularly when mounted on frames as shown, and at the same time permitting complete visibility for the operator to observe the performance of the machine.

The vinyl resins are well adapted to an application such as this, because of their tough and wiry properties, excellent resistance to the effects of water and water vapor, as well as to chemicals and solvents, satisfactory transparency and excellent flexing life, nonflammability, and resistance to shrinkage.

Thiokol Molding Powder

A new molding powder developed by the Thiokol Corporation of Trenton, New Jersey, makes possible the molding of synthetic rubber parts with excellent resistance to solvents, greases, oils, fuels, sunlight, ozone and atmospheric oxidation. The new powder, which becomes vulcanized at 300° F to 360° F to form a tough resilient elastic solid, has proven itself an excellent material for compounds which are required to remain flexible at temperatures below 50° F and remains serviceable to temperatures in excess of 220° F.

A wide range of rubber mechanical goods can be molded from the new "Thiokol" Mp 610 molding powder. Some typical possibilities for the new material include washers, valve seat discs, grommets, packings and gaskets, oil resistant hose and other molded parts for the aviation, marine and automotive industries.

The Thiokols (except one which is a Buna N synthetic rubber) differ in processing and performance characteristics from both natural rubber and the other commercial synthetic rubbers. In addition to characteristics mentioned above, they excell in resistance to deterioration.

Thiokol Molding Powder should be thought of in terms of soft vulcanized rubber rather than of hard rigid plastics, when considering the properties molded from this powder. For example, rigid plastics display tensile strengths of from 1000 to 10,000 psi with elongations up to 1 percent while soft rubber goods fall into the tensile range of 200 to 3000 psi with elongations of from 100 to 1000 percent.

INFORM-A-GRAM KEY No. E24-Z

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Blind Rivet Designed In Plastics

One-man operation and blind fastening are important advantages of the new "Des-Rivet" a cleverly-designed new product of the Victory Manufacturing Company, 1105 Fair Oaks Avenue, South Pasadena, California. The design of the new rivet is based on a wedging action, and makes good use of the tendency of plastics materials to flow under pressure.

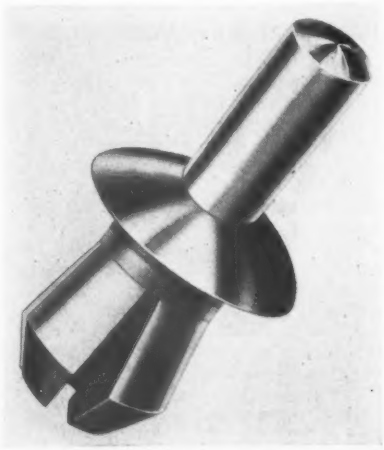
"Des-Rivets" are molded as one piece consisting of a head with plug attached by a thin breakaway section and a tapered split to form four tapered fingers. The shank and head are hollow to the same diameter as the plug.

The "Des-Rivet" is applied by pressing the tapered fingers into a drilled hole. Taper on the outside diameter of the fingers reduces the inside diameter of the shank, the rivet and work being held in place by the pressure of the depressed fingers. Impact from the rivet gun, which may be manual or air operated, instantaneously shears the plug and drives it into the plastics shank until the plug is flush with both ends of the rivet, maintaining the contour of the rivet head. Complete installation is accomplished by this single operation.

The wedge action of the plug in the tapered shank expands the fingers against the walls of the drilled hole and upsets the shank end of the rivet. The fact that the "Des-Rivet" creates its own upset end by flow of the plastic allows for a wide variation in the thickness of the materials being used.

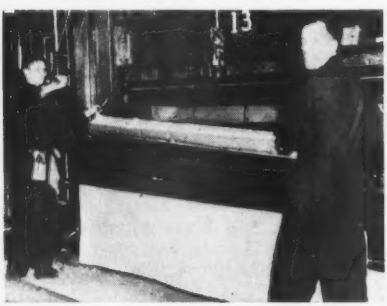
"Des-Rivets" may be singly inserted or assembled in "sticks" by inserting the undriven plug of one rivet into the shank of another. An automatic rivet gun is available to accommodate sticks of rivets, making possible a very high rate of installation. A single operator and access to one side of the work is all that is required, eliminating the normal requirement for a helper to buck the rivets.

INFORM-A-GRAM KEY No. E25-Z



Bazooka Tube Roller

A special paper plastic, developed by General Electric Company, is being used in making flying bazooka rocket launchers for Thunderbolt and other fighter planes. Plastics were adopted because of their lightness and the speed with which they can be formed; the type being used is fire-resistant, to withstand the blast thrown by the rockets.



This special paper is rolled into tubes ten feet long and 4½ inches in diameter on a new type of tube roller, illustrated, which was produced by the Baldwin-Southwark Division of Baldwin Locomotive Works. The bazooka installations, which are mounted under each wing of the plane, three in a cluster, weigh approximately 450 lbs, and the walls of the barrels are about one-fourth inch thick.

★

Santocel Now Waterproof

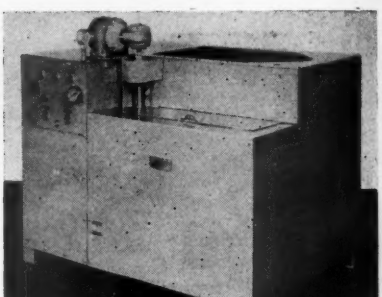
Santocel, Monsanto Chemical Company's new insulating silicon derivative, has been made still more versatile by a new process which makes it waterproof. The chemical used to accomplish this was developed by research chemists of General Electric Company, and is in itself considered a development of major importance.

Waterproof Santocel, which also embodies the original insulating efficiency and amazing lightness of regular Santocel, will be used in products such as life jackets, sleeping bags and hunters' coats, which will be subjected to outdoor usage and must be waterproof. For other applications where waterproof qualities are not necessary or desirable, regular Santocel will still be used.

Plastic Coaters for Ethyl Cellulose Compound

The Youngstown Miller Company, Sandusky, Ohio, has designed two small Plastic Coaters. The increasing use of these protective coatings has brought up the urgent need for suitable low capacity heating and melting equipment.

These machines are designed to melt properly ethyl cellulose compound and other plastics used for protecting parts and tools being stored or shipped.



All the features of the large units are included in the small units to insure the proper and satisfactory use of plastic coatings. Each one has a plastic pump arrangement which provides constant level in the dip tank and continual removal of surface film and bubbles caused in dipping. In addition, oil jackets the sides and bottom of each tank. The chromalox electric strip heaters are mounted on the bottom under the oil. Melting plates installed in the melting compartment conduct heat from oil to plastic pieces to be melted.

Model 3-8 has a capacity to melt from 3 to 5 pounds of plastic per hour with a dip compartment 6" wide by 9" long and 6" deep. Model 3-5 is the same with a dip tank of 13" deep.

Model 5-8 is illustrated. This model will melt from 5 to 7 pounds of plastic per hour and has a dip compartment 9" wide by 12" long and 6" deep. Model 5-15 is the same with a dip tank 13" deep.

INFORM-A-GRAM KEY No. A74-Z

Hot Dip Coating Tank

Originally developed for overseas packaging protection, ethyl cellulose coatings are now being used to protect tools in tool cribs, stock rooms, and tool production lines.

The small toolroom model hot dip tank below has been specifically designe by the Aeroil Products Company of

West New York, N. J., for this work. The unit can be used on either AC or DC current, and is equipped with standard two-prong plug and seven feet of cable, so that it can be plugged in anywhere it is needed, and a removable cover which minimizes heat losses between dipping operations.

INFORM-A-GRAM KEY No. 776-Z

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National Instrument Society Formed

A new national society to be known as "The Instrument Society of America" was organized in Pittsburgh on April 28th at a conference attended by delegates from fifteen measurement and control instrument societies that have been growing in different industrial centers throughout the country. The purpose of the Society will be to advance the arts and sciences that are connected with the theory, design, manufacture and use of instruments. The society is non-professional, and offers membership to any person, firm or institution interested in the objectives of the Society. Pro-tem officers were elected as follows: President—A. F. Sperry (Chicago); Vice President—C. F. Kayan (N. Y.); Treasurer—C. E. Fry (Pittsburgh); Secretary—Richard Rimbach (Pittsburgh). Various committees were also appointed to proceed with the organization work, and preparation of constitution and by-laws. The office of the Secretary is the temporary office of the Society and is located at 1117 Wolfendale St., Pittsburgh 12, Pa.

★

Rod Molding Shortcut

Burned-out fluorescent light tubes are being used to mold plastics rods for various uses in the Glenn L. Martin Company plant, Baltimore, Md. The demand for plastics rods for tool handles, stiffeners, etc., was far in excess of equipment for molding them until this plan was suggested by Melvin Young, Plastics Methods Engineer of the company.

By this method one end of the tube is cut off and the tube is filled with a liquid Catabond or Catavar thermosetting resin, then placed in an oven for curing. The cured plastic, still in the tube, is removed from the oven and the glass chipped off, leaving a perfect rod which requires little polishing and can be cut to various lengths according to the use for which it is intended.

Since the burned-out tubes have no salvage value, this constitutes an extremely ingenious and inexpensive method of molding rods, and in a large factory such as the Martin plant, the supply of these tubes is almost inexhaustible.

Tungsten-Moly High Speed Again Assumes Major Role

by A. J. Scheid, Jr.
CHIEF METALLURGIST
Columbia Tool Steel Company

High speed steels containing molybdenum are again brought to the forefront with the War Production Board's Order of April 7 again restricting the production and purchase of all tungsten high speed steel.

The increasing military demands for tungsten have again made this material a "critical" item but fortunately the production and use of tungsten-molybdenum steels will relieve the pressure on the tungsten situation and at the same time adequately meet the tooling needs of war production.

The present Order classifies steels as Class A containing 6.75% or less of tungsten and more than 3% molybdenum and permits the purchase and production of these materials necessary to fill controlled material orders for these products. The Order similarly defines Class B steels as those containing quantities of tungsten over 12% and limits their purchase and production to 15% of the total high speed steel produced or used in any calendar quarter. Exception is made in the purchase of material from warehouses, and unfilled purchase orders entered before the date of the Order which can be shipped by June 1st.

Regardless of whether the new order is short-lived or not, it is a fact that the great majority of users of high speed steel, makers of perishable tools of this material, and the producers of steel will experience no hardship by reason of this change. The most popular type, namely the 6% tungsten-5% molybdenum material, has now been well standardized by the trade and is of a proved merit. There may be some reason to debate whether this material is superior in all cases to straight tungsten high speed steel, though there is strong evidence to support this. It is, however, now generally agreed that it is of equal or greater efficiency in the great majority of tools and the prejudice against it due to lack of familiarity and early experience with variations of final composition have largely passed.

It must be recognized that the tungsten-molybdenum steel makes claim to being a superior product of inherently lower cost and produced with less alloy. Besides being of value in war production, it has a rightful place in the post-war planning of users of this type of product. The use of this material is not only patriotic, but carries with it a promise of post-war reward in return for present cooperation.

To those who feel inconvenienced by this Order let it be said that this may well be a "blessing in disguise".

Dyeing Metal Parts for Identification

by R. P. Cole
CHIEF CHEMIST
Eaton-Clark Company

Dyeing small metal parts such as rivets, bolts, screws, springs, etc., for quick identification has been very helpful to the war effort by way of eliminating errors and helping to meet production demands. The process has proved itself to be a worthy carry-over into the postwar picture.

At the beginning of this war, factories were hiring inexperienced help much faster than it was possible to give them a thorough training, and many of these new employees could not differentiate a ⅛" rivet from a ¼" rivet.

In the aircraft industry where things had to be speeded up to a tremendous rate as compared to previous months and where many of the rivets were being frozen prior to insertion so as to insure snug fits, it was highly important that no errors in size of rivets selected should be made. It was with this thought in mind and with an effort to avoid such errors that color was first used on aluminum rivets. The employees were told to insert, for example, the red rivets in certain sections, green rivets in others, and so on down the line. One can readily understand that many of the employees who could not remember the names of parts and could not quickly detect variations in size could very easily detect colors and remember where certain colors were to be applied. This practice immediately reduced errors and greatly increased speed of operations.

Foremen from other departments, seeing what had been done with rivets, realized the possibilities if, perhaps, small springs could be colored for the same purpose, and it wasn't long before many springs were being put through the dye for this purpose. Following this, bolts, nuts, small parts of every description were being treated in like manner.

It took considerable research and experimenting to secure the proper dyes for use on various metals as some dyes have an affinity, let us say, to aluminum, while others can't be used on aluminum at all. In general it's hard to make use of these dyes on a highly finished, hardened steel tool, and it's impossible to make any of them for practical use on chrome or nickel finished parts.

Dyestuffs are transparent and, therefore, the base metal will show through the coloring; in other words, you don't get the opaqueness as you would if paint or lacquer were to be used. Any of the colors that have been developed by Eaton-Clark for dyeing metals may easily be removed by washing in mild alkali or alcohol, yet seem to be quite fast to oil.

In some cases the dyestuffs have no affinity for metal and it is necessary to add a very small amount of gum to carry the color and make it hold on the surface of the metal.

Inasmuch as there is such a small amount of dye used and it very largely impregnates itself in the surface of the metal, it does not alter the dimensions of the piece of metal or part being dyed, which is, of course, essential to close tolerance parts.

Dyeing of metal surfaces in this manner is not practical for use on wearing surfaces. These colors in the main are intended only for identification during assembly. They will not stand wear nor excessive heat as, for example, the heat that a drill would be subjected to in drilling metal. The color would not stand up under such procedure.

Getting back to the springs, they were being colored not only for size, but in the case of compression springs, the number of coils and the weight of the wire in the spring were identified by various colors.

In the aircraft industry, couplings are being dyed to distinguish gas, water, oxygen and air lines one from another.

Eyelets and grommets have been dyed, clock and watch wheels for number and size of cogs. It has been tried on drills, but as before mentioned, the color will

(TO PAGE 130—PLEASE)

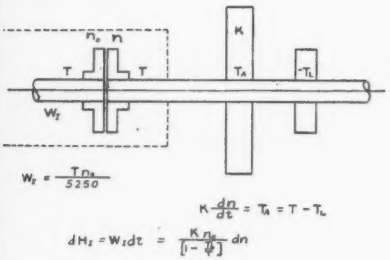

FIG.6

Mechanical analysis to illustrate heating of the rotor.

(CONTINUED FROM PAGE 112)

ing in the rotor is a product of the time of acceleration and the average loss in the rotor, we find that the rotor heating is independent of the rotor resistance. It actually is equal to the total energy absorbed in the accelerated mass. This indicates an overall efficiency of the rotor of 50% during acceleration.

The heating of the rotor when the whole system is subject to a change in speed is well illustrated by the mechanical analogy shown in Figure 6. Here a constant speed source of power is coupled to the system through a clutch with speed torque characteristics identical with the motor in question. The output clutch plate itself may be considered equivalent to the rotor which is rotating at speed n due to friction with the other plate which is rotating at constant speed n_o.

The torque required to change the speed of the flywheel is proportional to its moment of inertia and its acceleration. The input to the clutch is proportional to the product of its input speed n_o and the torque T. The torque available for acceleration is the difference of the motor torque and the load torque i.e., $(T-T_L)$. This results in the heating energy in the rotor (clutch) being independent of the torque if the load torque is small. Figure 7 shows the angular momentum K_n plotted against n. This is used so that the heating and other energy components are represented by areas under and over the curves. The sloped line AD is K_n and the horizontal line is Kn_o.

With a negligible load torque, we see that the energy input in accelerating from O to n is given by K_n x n and is represented by the area ABFE. The part of this absorbed by the rotating mass is obviously $\frac{1}{2} K_n^2$ represented by the area AEG. Hence the remaining area ABFG represents the heating in the rotor due to the acceleration from speed O to speed n. By the same reasoning the heating in the rotor in a speed change from n1 to n2 is given by the area HIJK which may be shown is proportional to the difference of the square of the slips. This loss due to slipping is much the same as exists in the clutch.

The heating of the stator bears the same ratio to the heating of the rotor as does its resistance to the resistance of the rotor. From this we see that for the minimum total heating of the motor it is desirable to have a small ratio of stator to rotor resistance. Since there is a limit to how low the stator resistance can be made, low stator heating is accomplished by using a motor with a higher rotor resistance. The rotor heating on acceleration as previously pointed out is equal to the energy absorbed by the moving mass and independent of rotor resistance. This takes place during the change of motor speed from zero to full speed and a change of slip from unity to zero. When a motor is plugged to a stop the speed changes from full speed to zero speed and the slip from two to unity. This results in a rotor having a rotor heating of three times that for acceleration. From this we see that a plug reversal has four times the heating of an acceleration.

Since all these changes in speed take place over relatively short spaces of time, we may without much error neglect the dissipation during the changes. This means that the heat results in increasing the temperature of the member in which it is generated. Hence the temperature of the rotor at the end of an acceleration will be proportional to the rotor heating and inversely proportional to its thermal capacity. Incidentally, the losses during acceleration are 30 to 40 times as great while running at full load since the losses vary as the square of the line current. From this we see that although the motor may be perfectly capable of dissipating the heat generated when considered over the whole duty cycle, it is possible for the rotor winding to overheat on a single acceleration. This is more true on the double

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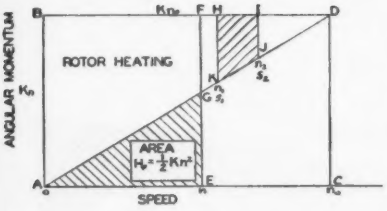


$$H_t = H_a + H_r = Kn_1n \; ; \; H_a = \frac{Kn_1^2}{2}[1 - S^2]$$
$$H_{rot} = \frac{Kn_1^2}{2}[S^2 - S_2^2]$$

FIG.7

Flywheel momentum is plotted against speed to show heating and other energy components relatively.

deck motor than for any other.

The double deck motor may be considered without much error as being equivalent to two separate motors. The top part will be equivalent to a rotor with torque characteristics shown on curve 3 of Figure 1, while the bottom part will have characteristics as shown on curve 1 of Figure 1. When we consider two motors connected to the same inertia load it is necessary that the total rotor heating be the same as if one motor is connected to the same load. However, the division of heating between the two rotors will be proportional to their respective contributions to the torque. Since the upper winding of the double deck rotor contributes most of the torque during acceleration and has a much smaller thermal capacity, one can well see what temperatures it may attain when the motor is accelerating a high inertia load. Even if excessive temperatures are not reached, the temperature differentials result in unequal expansion and contraction which may cause mechanical failure in rotor bars. It is for these reasons that Class 2 motors should not be used on applications with frequent starting and stopping.

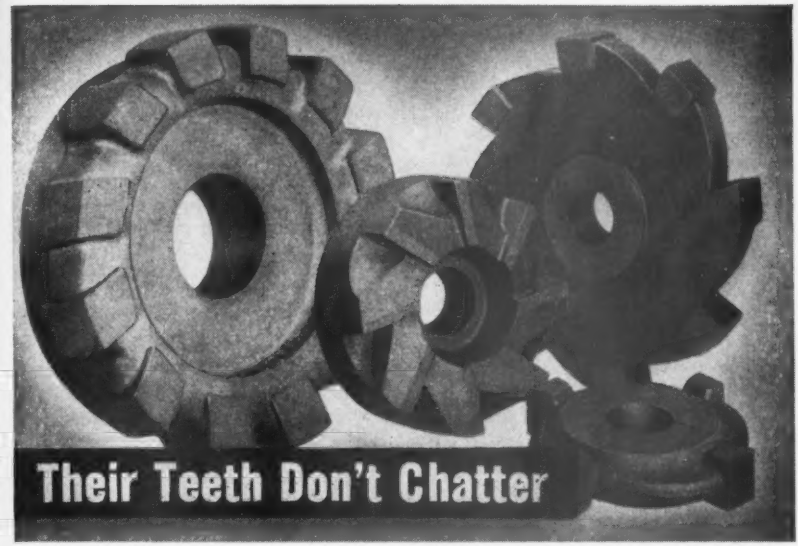
The mechanical analogy to the double deck motor is shown in Figure 8 where the top deck is represented by a small clutch (C) with high torque transmission and the bottom deck by a large clutch (B) with small torque transmission. Here we see that the heating is highest in the small clutch transmitting the most torque. The folly can be seen in using such a transmission scheme for accelerating a high inertia load.

One way to reduce the excessive heating in the rotor of a squirrel cage induction motor when accelerating an extremely high inertia load is to make use of a multi-speed motor. These multi-speed motors have 2, 3, or 4 running speeds depending upon the design of winding. Any primary winding can be arranged for a regrouping connection which gives two fixed speeds, one one-half the other. It is also possible to wind two separate windings on a stator and by regrouping this second winding to get a total of four speeds. By going through the proper sequence of operation by starting on the low speed winding and successively transferring from one winding to the other up to the maximum speed, a motor can accelerate a given inertia with only 25% of the rotor loss if the motor load were accelerated with a single speed motor. The comparison of heating is shown in Figure 9, and it is obvious that the higher the number of speeds the lower the rotor losses, and with an infinite number of speeds the rotor loss would be zero. This condition is approached with a variable frequency drive where a squirrel cage motor is controlled in speed by varying the frequency applied to the stator. This represents a very special form of control, and though it has been used in many instances is not particularly applicable to machinery electrification and will not be described further here.

The multi-speed motor is also very effectively used in decelerating a load by transferring from the high speed to the low speed windings in sequence and is a much more efficient and definite way of slowing down a squirrel cage motor than by plugging.

While the use of a multi-speed motor materially reduces the losses during acceleration, the motor is practical for this purpose only when the external inertia is large compared to the inertia of the rotor itself. This is due to the fact that the multi-speed motor itself is larger than a single speed motor and therefore has considerably more inertia in its rotor than a single speed machine. Also the same results can be obtained by the use of a wound rotor induction motor with external secondary resistors. However, many applications demand slow-downs at the end of the cycle, and here the multi-speed squirrel cage motor is very effectively used.

(TO BE CONCLUDED NEXT MONTH)



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Industrial Tool Division
Dept. J, Mount Vernon, Ohio

TOOLS ARE WEAPONS — TREAT 'EM RIGHT

(CONTINUED FROM PAGE 100)
can be plated so that all the wear will be upon the chrome plate. As the plate wears off, the contrast should warn any operator in sufficient time to have the gage stripped and replated. A small plug gage is now being tested by the writer on a continuous operation but results cannot be accurately put down because after several weeks of use the gage shows no measurable wear.

The fact is obvious that in plating carbide gages the thickness of the plate is a definite factor as to tolerance restrictions. However, the writer has found that a good plating tank operator can, with experience, so adjust his anode positions and vary his currents to consistently throw a .00005" plate with an average immersion time of 50 to 60 seconds.

In investigating the economy of chrome plating carbide tipped tools these factors must be balanced:

Advantages or Savings

1. Fewer tooling setups.
2. Fewer tool failures.
3. Less tool regrinding time.
4. Reduced tool inventory.

Additional Expense or Cost

1. Chrome cost.
2. Extra handling time after grinding.

The savings effected are actual and of course vary with each job and application. The actual cost of the chrome plate per tool is problematical, but a fair estimate of the entire cost per tool would be the actual handling time multiplied by the departmental overhead.

In the experimental application on the particular tool described, the savings effected in man hours of labor for setups and tool grinding against the handling time on the plating of the tool resulted in a saving of .42 hours per machine per shift. The other intangible factors of tool inventory, tool failures, reduced scrap were not figured due to the lack of definite data. However, they do figure in the picture over a long run period. In reducing handling time, loading racks can be devised so that particular type tools can be handled quickly.

In conclusion, the writer wishes to state that the chrome plating of the carbides is definitely still in the experimental stage with him. He offers no basic data other than that described herewith. It may or may not figure in the future as a tooling practice. However, he feels that the possibilities are interesting and hopes that the reader may do further experimenting on his own.

As stated before, chromium has proved to have low friction, non-wetting and non-galling characteristics. It is placed as number nine in a series of ten in Moh's scale of hardness, just below the diamond. The writer believes that its efficiency in the tool cutting field depends directly upon the hardness of the base or parent material upon which the plate is deposited and upon the conditions under which it is used.

Where a force is in the same plane, it tends to separate or lift the plate from the base metal and is not feasible, as for instance in the case of plated twist drills. Any condition where the force acts at an angle approaching ninety degrees has proved itself worthy of trial.

For working materials of extreme abrasive quality such as plastics, glasses, ores, etc., the chrome plated carbide tool should be less liable to crater and abrade, thus overcoming one of its chief liabilities.

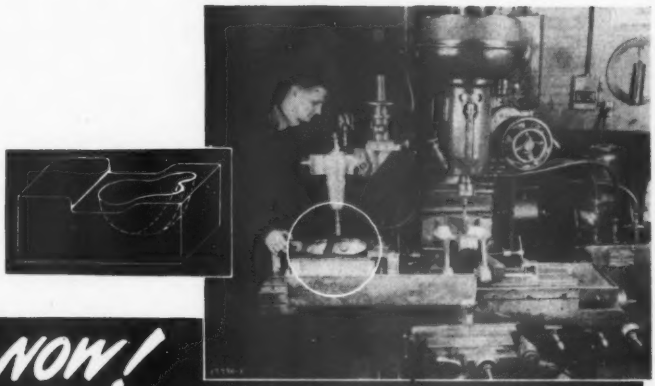
★

(CONTINUED FROM PAGE 125)
burn off when the drill is in use. Small nozzles and many special parts are now being dyed for quick identification.

In addition to dyeing parts for identification in process of manufacture and during assembly some manufacturers are now dyeing their metal parts or tools to lend added sales value. They also report that the green dye which is being used not only provides identification of their brand of tools, but also helps to prevent the tool from rusting while kept in stock, either in their own plant or in the tool crib of the user.

It is easy to see the many possibilities of dyeing small tools for the sales value that such coloring will give, and especially this is true where it doesn't make any difference whether or not the color wears off after the tool is put into use.

A great many plastics parts are now being dyed with Eaton-Clark dyes, both for identification purposes in process of manufacture or assembly and also for the added sales value it provides. Additionally the colors. light blue, green, amber, etc., as applied to the plastics parts, especially transparent guards, tend to reduce glare.



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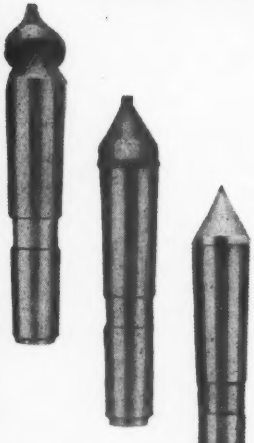

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Building Labor Productivity

Labor and management have shown great interest recently in those factors which concern labor's wages, efficiency and productivity as a basis for postwar prosperity. This subject has been well presented in a paper prepared by John D. Corrigan of Corrigan, Osburne & Wells, Inc.

We have heard much about job evaluation and wage incentive plans as an answer to the problems of production. Both labor and management believe that it will be difficult or impossible to reduce rates when our production pace slackens; also, when overtime hours are cut it will increase the pressure for higher hourly rates to offset partially the loss of overtime.

If prices and volume decline after the war, it will become economically impossible to pay the rates now paid for the work done. There is, apparently, only one solution which has been proved and worked out in industry over a period of forty years, and that is to increase efficiency and productivity to the point where improved results will justify the wages paid.

It has been definitely proved that 90% of all labor trouble in a plant is the direct result of some petty grievance. Therefore, management's first step to increase labor productivity is to eliminate the main source of grievance, which can be done by proper wage administration.

Job evaluation is the basis of proper wage administration. We are now in the middle of a labor era in which job description and analysis is essential and necessary in the writing of contracts and in the handling of wage grievances. These things are so highly important today that a comparatively new management technique has been put into operation under the title of "Job Evaluation". In addition, the government wage stabilization procedures and policies call for rate comparison on an interplant or area basis.

Job evaluation, when properly engineered, constitutes a fair and proper comparison between jobs and makes readily apparent the many values of the different jobs so that hourly rates can be applied. Job evaluation is definitely tied up with the subject of labor productivity because sound relationships between the rates paid and different jobs encourage satisfaction on the part of the worker which is reflected in satisfactory production. Since job evaluation eliminates unfairness and inequities in the wage and salary structure, one of the most potent sources of employee discontent can thereby be minimized.

In the hourly rate, which is not an incentive, the individual is paid so much per hour or per day regardless of the amount of his production. According to Mr. Corrigan, after scientific hourly rates have been established, management is then interested in obtaining standard performance of the worker. Experience has shown that where an hourly rate is paid the efficiency of the plant tends to become that of the poorest worker and this type of compensation puts the burden of inefficient work entirely upon management. Furthermore, it tends to encourage better workers to sink to the level of poor ones. However, if a standard is set and a worker knows what his requirements are for his hourly pay and that should he exceed the standard requirement he will receive additional pay, he will become a more effective worker and the plant will exceed the standards set instead of working 25% to 40% below standards.

Here again the incentive must be based on the principles and experiences acquired by industrial engineers since Frederick Taylor first established a piece rate system in 1897.

Mr. Corrigan stated that incentives fall into three general classifications: (1) individual, (2) group, and (3) combination of individual and group. The form of incentives follow three general types—piece rate, point system, and standard hour.

Under the piece-rate system a worker is paid so much per unit of production regardless of the time it takes him. Obviously, this type encourages the worker to work as fast as possible. However, it is often discouraging to beginners who find it difficult to earn an adequate wage. It's also unfair at times in its operations as it puts the burden of improper management on the employee. Another fault of the piece rate is that it does not provide a standard to shoot at or by which to measure achievement. It is difficult to tie in with a modern type production control system which is based on time.

The point system gained so much disfavor from poor management and labor that it's rarely used today. Since labor could not figure out its bonus under numerous types of point systems (most of them carrying names of the men who developed them), labor has learned to distrust them.

The standard hour incentive is intended to overcome the faults of the other incentive systems. Under this type both the time rate and the piece rate are combined, a standard is set and an incentive bonus or reward is given for exceeding it so that beyond this standard the wages are increased directly with efficiency. No industrial engineer will claim that any incentive system does not have certain weaknesses. However, if they are properly installed and supervised, they will result in effectively maintaining cost standards.

The group bonus is basically paying more than one individual on the same basis as the individual bonus but where the work requires more than one employee working as a team to accomplish the results desired.

Incentives will reduce overhead by getting the work done and magnify the need for better scheduling and other management techniques to improve operations in the entire plant. An incentive's special advantage to the worker is that it makes it possible for him to actually earn a higher wage—giving value for value received.

Job evaluation and incentives may be the cure for the discontent that can be expected when the volume of work is reduced following the war.

Largest School House on Wings

The Mars, world's largest flying boat, returned on May 1 to its "home" at the Middle River ramp of The Glenn L. Martin Company, Baltimore, Md., after completing 136 regularly scheduled flights carrying top priority personnel and war materiel between Alameda, Calif., and Pearl Harbor.

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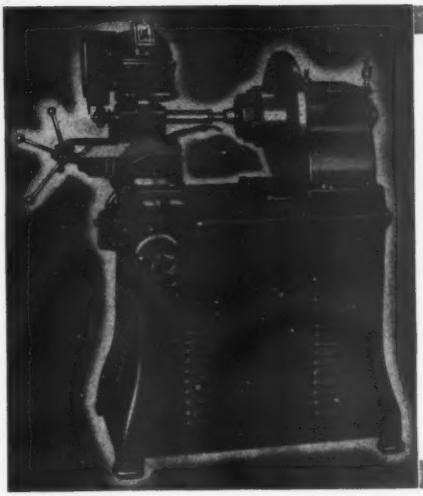
The opening class, composed of 80 picked officers and men of the Naval Air Transport Service, will be given one of the most intensive naval aviation training courses ever undertaken. These men and members of the classes to follow will be assigned to the twenty new Mars flying boats currently in production at the Martin plant, where the original 72-ton boat was built. In all, a total of nearly 1000 men will be trained at the new school during the coming year by Navy and Martin instructors.

In her flight record of 68 round trips, the Mars carried more than 2,800,000 pounds of cargo. This amount is equivalent to 20 trains, each consisting of 32 fully loaded freight cars, traveling around the world at the equator.

The Mars achieved this outstanding record since she went into service on January 18, 1944. Since January 1, 1945, the big ship has not been beached for any major overhaul until prepared for the trip home.

Built as a patrol bomber and later converted to a transport, the Mars has been a utility ship throughout her entire Pacific service.



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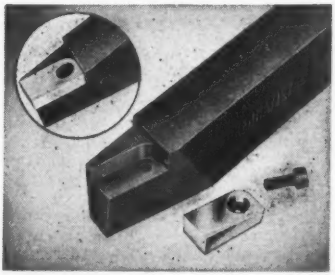

larger sizes, with formed clearance angles, RH or LH, and in all standard grades of Kennametal. Complete tools of various styles—straight edge, lead angle, offset, etc., can now be furnished with the screwed-on tips, or separate standard blanks will be supplied to those who wish to make their own tools. Blanks of non-standard shapes and sizes having this feature may also be had for special tools, such as are used in shell turning, forming, cutting of radii and grooves, etc. KENNAMETAL, INC., Dept. TD, Latrobe, Pa., will send additional data.
INFORM-A-GRAM KEY No. 33-Z

DOUBLE COIL SPRING LOCK WASHERS. More resistance to shock, vibration, severe service and far greater reactive spring pressure than a fine lock washer are some of the features that the George K. Garrett Company claim make their new Double Coil Spring Lock Washers especially valuable for use on grading, bulldozing, agricultural equipment and all other types of heavy machinery. Double Coil Washers can be furnished in sizes for No. 4 screws up to 1" and larger bolts, in any desired finish. They are manufactured under the same rigid supervision and "Controlled Tension" principles used on the Garrett Co.'s complete line of Diamond products. Each washer is "torture tested"—subjected to more severe tests than will ever be encountered in actual use. This company has also designed and manufactured double coil washers of light sections for many special uses in the electrical and allied industries. For sample and/or illustrated Bulletin 109, write George K. Garrett Co., Inc., Dept. TJ, 1421 Chestnut St., Philadelphia 2, Pa.
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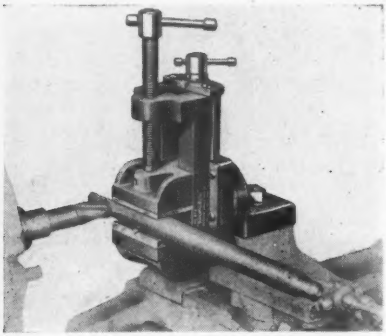
PROGRESS ON PARADE

MILLING ATTACHMENT. Intricate milling operations are now possible by mounting the No. 25 Palmgren Milling Attachment to the cross slide of any standard engine lathe. The lathe can be converted to do the work of a universal milling machine by using its cross slide horizontal feeds and the Palmgren Attachment's vertical feed and angle adjustments. The No. 25 is equipped wtih a graduated screw for vertical adjustments. The vise has 2½" jaws which open 2½" and are



grooved for holding round pieces. The vise rotates on a base which is graduated 360°, permitting it to be set at any angle required. The attachment, which is designed for use on South Bend, Dalton, Atlas, Craftsmen and other similar lathes, is bolted to the cross slide by one sturdy T-slot bolt, fitting into the T-slot of the lathe tool post. The No. 25 Palmgren Milling Attachment is manufactured by CHICAGO TOOL & ENGINEERING CO., Dept. T, 8388 South Chicago Ave., Chicago 17, Ill.
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of The Ripley Co., Dept. TJ, Torrington, Conn.
INFORM-A-GRAM KEY No. D42-Z

THE NEW, ALL-ANGLE MAGNIFIERS, manufactured by Ullman Products Co. of Brooklyn, N. Y., have been developed to provide ease and accuracy in the inspection of small objects. These new illuminated models are known as Ullman C-Master magnifiers and are made in three styles—two stand models and a portable hand type. The lighting equipment of the Stand Model 410 and Portable Model 610 consists of four incandescent tubes which can be lighted two at a time or

all four at once. Two fluorescent tubes are used in Stand Model 210. The illumination feature, combined with a large, clear 4½" double convex lens, ground and polished, eliminates squinting and eyestrain since these all-angle, swivel-action magnifiers assure undistorted view of the work inspected. Information and prices on the Ullman C-Master magnifiers will be sent by ULLMAN PRODUCTS COMPANY, 857 Fourth Ave., Dept. TDJ, Brooklyn 32, N. Y.
INFORM-A-GRAM KEY No. 874-Z

NEW SUPER CUTTERS FOR CAST IRON!

NOW...

THREE LINES OF SUPER CARBIDE TIPPED CUTTERS PROVIDE A CUTTER FOR EVERY METAL—EVERY JOB!

In line with its policy of constant development and improvement, Super Tool Company announces a new line of carbide tipped milling cutters designed specifically for use on cast iron, malleable iron, brass, bronze and similar metals.

Now . . . whatever your job, whatever the type of metal you are milling, you will find a Super Carbide Tipped Cutter designed to bring you faster, more efficient, more economical production. For the new cutters mentioned above are in addition to Super's line of general purpose cutters for aluminum, dural, magnesium and plastics and its line of carbide tipped cutters for steel that has established such amazing records of production and economy the country over.

Next time you order milling cutters, step up your production while you step down your costs by specifying Super Carbide Tipped Cutters designed specifically for the work you are doing.

Phone . . . wire . . . write today for complete information on Super Tool's new line of Carbide Tipped Milling Cutters for Cast Iron.

OTHER CARBIDE TOOLS FOR . . .

Turning, Facing, Reaming, Forming, Spot Facing, Boring, Grooving, Drilling, Grinder Rests, Wear Parts, Counterboring, Shaving, Centers and Special Purposes.

★

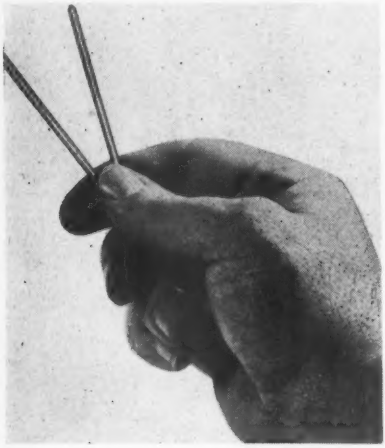
SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan ★ 4105 San Fernando Road, Glendale 4, California

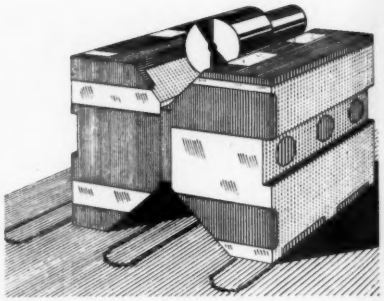
PROGRESS ON PARADE

SOLID TUNGSTEN CARBIDE REAMERS. Super Tool Co. of Detroit have announced the availability of their solid tungsten carbide reamers in sizes as small as .125". Reamers this small have hitherto been made only on special order but can now be shipped from stock. New manufacturing techniques also

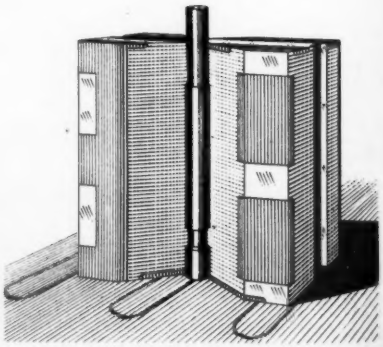


enable this company to produce these reamers in sizes as small as .09375". Sizes below .125", however, will continue to be produced only on special order. For additional information on these reamers, write SUPER TOOL CO., 21650 Hoover Rd., Dept. T-5, Detroit 13, Mich.
INFORM-A-GRAM KEY No. 168-Z

A NEW MAGNETIC V-BLOCK has just been placed in production by the MAG-V-BLOCK CO., Dept. TJ, 1031 Big Bend Blvd., St. Louis, Mo., that represents a decided departure in structure and which offers advantages over many early types of work holding magnetic V-blocks. The Mag-V-Block comprises two parallel bars and a separator. The bars are made from metal having magnetic properties, the separator from non-magnetic material, and the parts are held together by three pins, also of non-magnetic material. The bars are shaped with two pairs of faces which, in their assembled position, form a large and a small channel along the length of the block, having a V-shaped cross-section. The respective bearing surfaces of each of the two parallel bars are broken by spaced cut-away sections provided to contain inlays of non-magnetic ma-



terial, and the alternately exposed surfaces of the bars form contact points for magnetic connections with the poles of the chuck. The cut-outs are arranged so that the contact points of each bar are staggered with those of the other, thus permitting the magnetic material of each to rest on opposite alternate poles of the chuck. Through this improved method of assembly, it has been possible to greatly reduce the area of the joining surfaces of the bars with the separator. This has made it possible to construct the block with a small and large V capable of accommodating different size stock and the presence of the inlays makes it possible to greatly reduce the depth of the



This MILLING OPERATION was Made Easier and Quicker

Work is held securely in fixture for milling operation by a De-Sta-Co 210 Clamp. This shows how the solid work bar can be bent to any desired clamping angle without the necessity of special tooling or parts. An exclusive De-Sta-Co feature.

De-Sta-Co Clamps are designed to simplify and expedite many production and assembly operations. Especially suited for jig and fixture building.

Complete range of types and sizes described in New Catalog No. 45. *Send for it.*

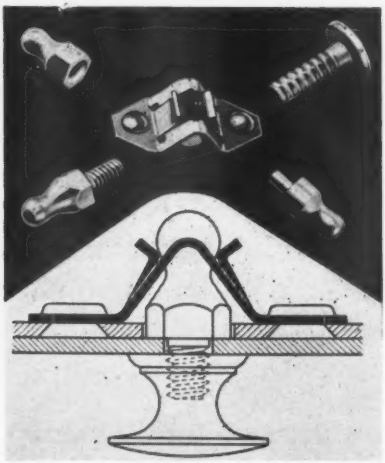
DETROIT STAMPING CO.

Established 30 Years

344 Midland Ave • Detroit 3, Mich.

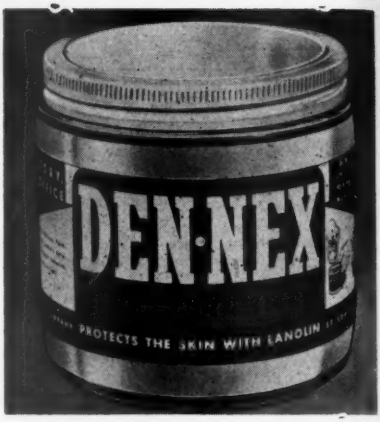
cut-outs, thereby increasing the volume of the magnetic bodies and increasing the magnetic strength of the block. In operation, the block is used in the conventional and well-known manner.
INFORM-A-GRAM KEY No. D50-Z

SPRING STEEL LATCH. For the instant attachment and removal of box covers, access doors, panels and inspection plates, Tinnerman Products, Inc. have developed their new Spring Steel Speed Nut Latch No. 1663. The spring arms of the Speed Nut snap over ball or grooved studs to provide firm attachment, yet studs may be quickly withdrawn. The Speed Nut is available in five degrees of pull-out tension (3½, 8, 12, 18 or 30 lbs) and is manufactured in three styles of ball studs—drilled and tapped for 6-32 screws, threaded



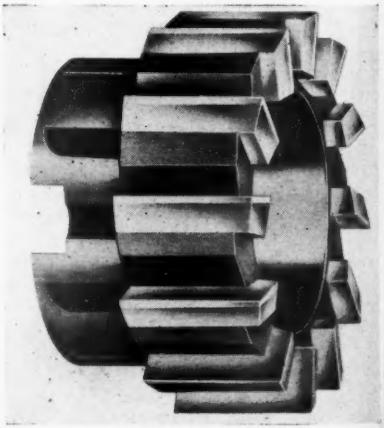
shank (6-32 thread) and plain shank for riveting. These, as well as the grooved stud, are provided in various lengths to suit application requirements. For additional data and sample of the No. 1663, write TINNERMAN PRODUCTS, INC., Dept. T, 2095 Fulton Rd., Cleveland 13, O., specifying the pull-out tension required, thickness of panel to which Speed Nut will be attached, type of stud and length of plain or threaded shank, or length of grooved stud.
INFORM-A-GRAM KEY No. 76-Z

A NEW CLEANSING CREAM for removing paint, lacquer, enamel, airplane dopes, varnish, resin solutions, synthetic adhesives, inks, dyes and other resistant materials from the



hands, is a product of the DENNIS CHEMICAL CO., 2701 Papin, Dept. TJ, St. Louis 3, Mo. This cream, called Den-Nex, eliminates entirely the necessity of using toxic and explosive solvents, often conducive to chaffed skin and dermatitis. Den-Nex is merely worked into the skin like soap until absorbent matter is loosened and is then rinsed off with water. It is free of abrasive, scouring or clogging substances; leaves the pores open and the skin thoroughly cleansed. Complete information on Den-Nex can be obtained from the Dennis Chemical Co.
INFORM-A-GRAM KEY No. D78-Z

SHELL END MILLS. Haynes Stellite Co. has announced the availability of small standard shell end mills with brazed-in blades made of Haynes Stellite cobalt-chromium-tungsten



What you want to know about Broaching

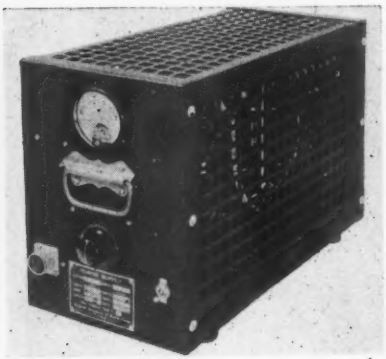
Answers to most questions on broaching methods and applications have been prepared by Colonial Broach Company, Detroit. Your copies are now available upon request on your company letterhead. Here are some of the printed bulletins now ready for mailing.

Ask for them by Bulletin Number

colonial BROACH COMPANY
DETROIT 13, U.S.A.
Broaches Broaching Machines Broaching Equipment

alloy. These cutters are furnished with blades of Haynes Stellite 98M2 or Star J-Metal brazed into a steel body. They are made with diameters ranging from 1¼" to 6" wtih face thicknesses from 1" to 2¼". The cutters are supplied ready to use for milling aluminum, bronze, cast iron, brass, alloys and some steels. Additional data can be obtained from HAYNES-STELLITE CO., Unit of Union Carbide and Carbon Corp., Dept. TD, Kokomo, Ind.
INFORM-A-GRAM KEY No. 313-Z

THE NEW POWER SUPPLY, announced by the Federal Telephone and Radio Corp., is a compact, light-weight, many purpose rectifier unit for use in aircraft manufacture and maintenance; for testing instruments; inverters; controls; radio navigational and communications equipment; and numerous other applications where an easily portable, well-regulated direct-current is required. The unit, designated as FTR-3128-S, utilizes the Federal Selenium Rectifier and operates from a single phase a-c input of 115 volts, 58 to 62 cycles; providing d-c power up to 10 amperes, continuous duty, at any selected voltage between 22 and 30 volts. Output voltage is auto-



matically held constant within + or — 0.5 volt regardless of load variation of from zero to 10 amperes, or a-c line voltage fluctuations of 105 to 125 volts. Ripple voltage is limited to approximately 5%. A feature of this unit is its ability to maintain its performance with line frequency changes which exceed those of commercial power lines. The unit, which weighs approximately 74 lbs., is enclosed in a black medium wrinkle finish cabinet, 11-¼" x 8" x 16". FEDERAL TELEPHONE & RADIO CORP., Dept. TDJ, Newark, N. J.
INFORM-A-GRAM KEY No. C55-Z

"HEAVY-DUTY" PNEUMATIC GRINDER, Model HDCR, is described in Bulletin 1004 recently issued by M-B PRODUCTS, Dept. D, 130-134 E. Larned St., Detroit 26, Mich. One of the outstanding applications for this versatile tool is the snagging of fair sized castings, particularly in the case of gray iron

and steel. The problem of lubrication has been entirely eliminated in this "Heavy-Duty" tool; because special grease-sealed bearings are used, no manual or automatic lubrication is required.
INFORM-A-GRAM KEY No. A86-Z

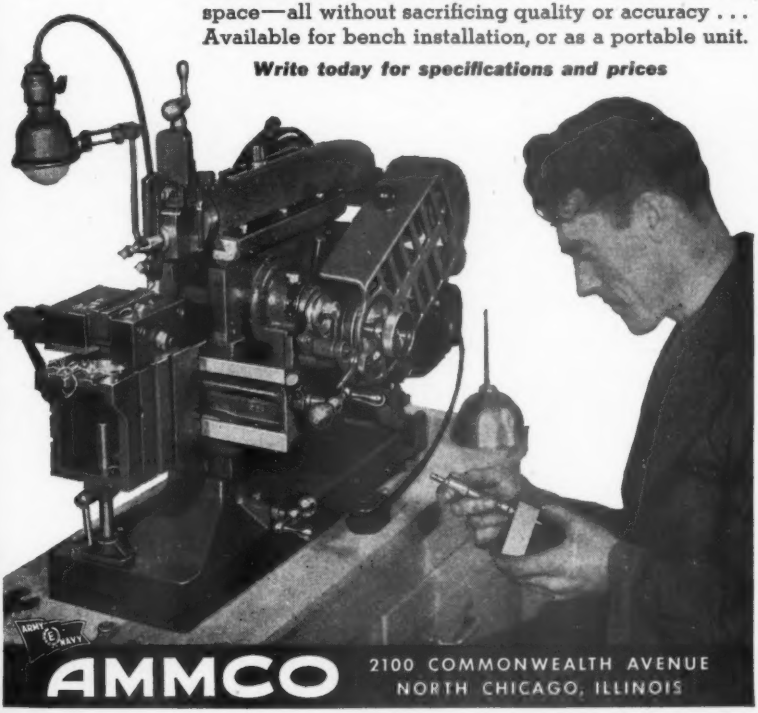
A TELESCOPIC TOWING HANDLE has been announced as the latest optional feature of the Lyon-Raymond Corp.'s Hydraulic Elevating Table. When extended, the handle provides means for easily moving the table from place to place; collapsed, it is below and under the table top where it will not interfere with operations involving the transfer of materials across the table or with the support of overhanging pieces. Other optional features of this table include a two-speed in place of a single-speed pump; retaining bars; removable roller top and indexing device. For additional information on this company's line of material handling equipment, write LYON-RAYMOND CORP., 2151 Madison St., Dept. TDJ, Greene, N. Y.
INFORM-A-GRAM KEY No. 374-Z

AMMCO 7″ SHAPER

A precision machine for precision work . . .

Phenomenal performance of this precision shaper in war production work is an indication of its great value in the postwar period when your competitive conditions put added importance on accuracy and low-cost production . . . The precise accuracy of work turned out on an Ammco 7″ Shaper assures precision production unsurpassed by larger machines selling for hundreds of dollars more than the Ammco . . . In addition to low initial cost, you also effect big savings in time and expense on set-up operations . . . You save on electrical power consumption . . . You save on floor space—all without sacrificing quality or accuracy . . . Available for bench installation, or as a portable unit.

Write today for specifications and prices



AMMCO 2100 COMMONWEALTH AVENUE NORTH CHICAGO, ILLINOIS

PUBLICATION PREVIEWS

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BULLETINS
SPECIFICATIONS

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VIBRO-TOOL—a multiple-use industrial instrument which marks, engraves, files, chisels and hammers even on the hardest metals, glass and thin plastics, and cuts rubber, cloth, thin wood and cardboard, is described in illustrated literature available from the BURGESS BATTERY CO., Handicraft Div., Dept. D, 180 N. Wabash Ave., Chicago, Ill. Weighing only one pound, this portable tool uses the vibration principle and puts temporary or permanent markings on tools, jigs, dies and production parts. It instantly engraves names on identification discs and trade-marks on finished parts.
INFORM-A-GRAM KEY No. E12-Z

AUTOMATIC SINGLE PURPOSE DRILLING UNITS are described in a 4-page leaflet published by the SIMPLEX TOOL ENGINEERING CO., Dept. D, 14899 Lesure Ave., Detroit 27, Mich. The outstanding feature of these units is their simplified construction and reduction of unnecessary moving parts which insure longer life and reduce wear. Simplex Units are not only adaptable for drilling, but they may be used for reaming, spot facing, or step drilling to a positive predetermined depth.
INFORM-A-GRAM KEY No. B63-Z

RUBBERIZED ABRASIVE WHEELS & POINTS for fine grinding and polishing are described in a 4-page bulletin available from the CRATEX MFG. CO., Dept. J, 81 Natoma St., San Francisco, Calif. Cratex Wheels for mounting on Polishing Heads, Grinders, Dental Lathes, etc., produce finely ground and polished surfaces. The Coarser Grits will cut evenly and smooth. Finer Grits are most useful after rough grinding and will deliver a medium, fine or mirror-like finish depending upon the Grit used. High speeds are not necessary for good results.
INFORM-A-GRAM KEY No. E21-Z

MILLING-DRILLING-BORING ATTACHMENT for heavy duty operations is featured in a 4-page leaflet issued by RUSNOK TOOL WORKS, Dept. T, 4840 W. North Ave., Chicago 39, Ill. This versatile attachment utilizes an almost unlimited variety of cutters, and will do end milling, die sinking, boring, fly cutting, and many other operations with extraordinary speed and accuracy. Six speeds from 250 to 3000 rpm are available.
INFORM-A-GRAM KEY No. 578-Z

LEVER OPERATED CHUCK called the "Jiffy Jig" which is useful for drilling, milling, boring and grinding is described and illustrated in a 4-page pamphlet available from the MONARCH GOVERNOR CO., Dept. TD, 1832 W. Bethune Ave., Detroit 6, Mich. Stock capacity ranges from $\frac{1}{16}$" to 1" cross sections and it can be used in horizontal or vertical position When "Jiffy Jig" is opened or closed, collet has absolute zero axial movement. Its simple and rugged design consists essentially of only three parts: base, cap and an operating lever.
INFORM-A-GRAM KEY No. E22-Z

PORTER-McLEOD MACHINE TOOL CO., INC., Dept. TJ, Hatfield, Mass., has issued a 4-page descriptive bulletin illustrating their cutting machines, engine lathes and sawing machines. Available in either bench or pedestal models, their wet abrasive cutting-off machine has a hinged wheel guard which gives instant opening and closing. The Cold Metal 8" Sawing Machine is recommended for both general and production work. Its construction permits nesting of bars or shapes for production cutting.
INFORM-A-GRAM KEY No. 112-Z

FIXTURE SET-UPS for the Rouse Hand Miller and other machines are described in illustrated literature available from H. B. ROUSE & CO., Dept. J, 2214 N. Wayne Ave., Chicago 14, Ill. These partial fixtures furnish everything except the actual holding device, thereby giving the user the benefit of the past experience of many other installations. All the Rouse Fixture Set-ups have slotted holes to allow for easy adjustment. The No. 5 Set-up has a round table surface with circular motion. This Set-up is well suited for the milling of slots for production work.
INFORM-A-GRAM KEY No. 106-Z

PUBLICATION REVIEWS

MILLING MACHINE TOOLS including arbors, cutters, vises, high speed attachments and center scopes are illustrated in Catalog No. C10 published by KEARNEY & TRECKER PRODUCTS CORP., Dept. T, Milwaukee 14, Wis. The center scope provides sufficient magnification to enable the user to actually see to the required accuracy and also provides means whereby the work reference location can be accurately aligned with the axis of the machine spindle. High grade lenses, ground and arranged to provide 45X magnification, permit the operator to see a movement of one ten thousandth of an inch (.0001"). In the center scope, runout compensation, an exclusive feature, is accomplished by swiveling a mirror mounted on a fulcrum by means of a knurled trimming screw.
INFORM-A-GRAM KEY No. 592-Z

MOLYBDENUM-TUNGSTEN HIGH SPEED STEEL. Latrobe Double-Six M-2 is the brand name of Latrobe Electric Steel Company's analysis that meets the automotive industry's M-2 specifications for moly-tungsten high speed steel. A new data sheet is now available for this grade. It describes the characteristics of the steel, lists the applications for which it is most suitable, the mill forms available, and gives complete details on how to heat treat for best results. Write LATROBE ELECTRIC STEEL COMPANY, Dept. TD, Latrobe, Pa., and ask for Data Sheet on Double-Six M-2, or use—
INFORM-A-GRAM KEY No. B-67-Z

DURABONDED COATED ABRASIVES which are highly resistant both to cutting heat and humidity are discussed in a 4-page folder issued by the BEHR-MANNING CORP., Dept. TD, Troy, N. Y. A typical application for "Durabonded" Metalite Fibre Combination Discs is illustrated. They're just right for grinding down welds and breaking edges.
INFORM-A-GRAM KEY No. 110-Z

FLEXIBLE SHAFT MACHINES are pictorially described in Catalog 130 published by the FOREDOM ELECTRIC CO., Dept. J, 27 Park Place, New York 7, N. Y. These versatile machines are particularly valuable for use on small irregularly-shaped parts which cannot be handled by conventional machine setups, and many plants use them for light production work and maintenance needs. Foredom Machines are used for grinding, polishing, milling, drilling, sharpening, slotting, sawing, cleaning, sanding, scratch-brushing, de-burring, engraving, glass-etching, rust-removing, etc. They can be employed on all metals as well as on glass, plastics and wood.
INFORM-A-GRAM KEY No. 563-Z

PRECISION HOLDING TOOLS are featured in a new set of data sheets just released by ERICKSON TOOLS, Division of Erickson Steel Co., Dept. T, 2309 Hamilton Ave., Cleveland 14, Ohio. This completely factual material includes detail drawings and specifications of Erickson Model 01 and 02 Chucks, Precision Collets, Adjustable Floating Holders, Expanding Mandrels and B & S Type Adjusting Holders, all of which are standard products, yet so designed as to be easily adapted to any specific holding problem which cannot be solved with standard equipment. The sheets are punched for a standard 3 ring binder, and when inserted in a product or source file, give a complete, new index of Erickson precision chucking equipment.
INFORM-A-GRAM KEY No. 556-Z

"HELEX" END MILLS, designed for the milling of slots, keyways and pockets where ordinary arbor type milling cutters cannot be used, are described in a 16-page booklet recently issued by the NATIONAL TWIST DRILL & TOOL CO., Dept. TJ, Detroit, Mich. Because of the high helix angle of their cutting edges, and the overall free cutting construction, they operate smoothly and efficiently even at high speeds. National Holders for these fast spiral end mills are furnished in three styles to suit the various milling machine spindles in common use.
INFORM-A-GRAM KEY No. C91-Z

TOGGLE CLAMPS, for clamping parts in production, are colorfully featured in Catalog 45 recently published by the DETROIT STAMPING CO., Dept. D, 344 Midland Ave., Detroit 3, Mich. The Plastic Grip, which can be fitted over the handles of most of these toggle clamps, has the appearance and physical properties of rubber, but is not affected by oil or grease. Illustrations and diagrams of numerous models of the De-Sta-Co line are shown. Bolt retainers, made in three standard sizes to fit onto end of work bar of various size De-Sta-Co clamps, are also described.
INFORM-A-GRAM KEY No. 165-Z

PRECISION GAGE BLOCKS, their specialized manufacture, high standards of quality, and accurately held specifications, are featured in a thoroughly descriptive booklet by WEBBER GAGE CO., Dept. T, 12900 Triskett Rd., Cleveland 11, Ohio. These gage blocks, made in a plant built specifically for production of ultra precision instruments, are notable for extreme dimensional accuracy, great stability, perfect finish, and long wearing quality during constant service. They are available in combinations ranging from .050" to 4" in sets or up to 8" as separate blocks. Class A blocks are accurate to plus or minus .000004" and B blocks are accurate to plus or minus .000008". Webber Heavy Duty gage blocks, available in two sets, illustrated and described by an additional bulletin, offer a measuring range of from .3000" to either

24.000" or 36.000" in steps of .0001". These sets include a base block; an end clamp; six eccentric clamps; one pair of caliper jaws; one each, scribing center and scriber. This Heavy Duty gage block set is made to stand the punishment of all-around, intensive shop use. The large blocks, that is from 1.000" to 6.000", have a cross hole at each end. These holes accommodate a cam action clamp which unites the several blocks quickly into one solid and rugged built-up gage more firmly than can be attained by wringing alone.
INFORM-A-GRAM KEY No. 621-Z

TOOL-BIT SELECTION INFORMATION is given in a folder issued by the CARPENTER STEEL CO., Dept. TJ, Reading, Pa. The folder shows the appropriate tool-bit to use for various types of work such as intermittent cutting; fast, continuous cutting, fine finishing, and hogging or rough turning operations. Gold Star Tool Bits are recommended for heavy duty continuous cutting at elevated temperatures. Because of the high red-hardness of this tool-bit, it is especially recommended for hogging cuts and rough turning work.
INFORM-A-GRAM KEY No. B38-Z

"VIMCOLIGHTS" are pictorially described in a 4-page leaflet issued by VIMCO MFG. CO., Dept. T, 109 Chenango St., Buffalo, N. Y. Illustrated are standard stock combinations of general machine lights, which fill the need for localized high-intensity lighting in the majority of cases. Scores of other assemblies are easily provided because of complete interchangeability of Vimco parts. Three lengths of flexible arms (10", 15" (Standard) and 18") are available as well as a wide variety of base assemblies, extension tubes (Standard 10") and reflectors. All conductors are fully encased giving protection against mechanical injury and accidents.
INFORM-A-GRAM KEY No. 116-Z

"TRACER-CONTROLLED" MACHINES are described in a condensed catalog, Form 1655-B, published by GEORGE GORTON MACHINE CO., Dept. J, 1327 Racine St., Racine, Wis. Their precision "Tracer-Controlled" machines duplicate any shape from original die or model to exact size—all kinds of dies and molds for plastics, rubber, glass, also drop forging dies, metal patterns, die casting dies, etc. The Gorton Pantograph Two and Three Dimensional Engravers produce precision engraved lettering, numerals and designs in all materials to any reduction from enlarged model, template or copy.
INFORM-A-GRAM KEY No. 711-Z

REAMERS & END MILLS are described in an illustrated booklet issued by the GAMMONS-HOAGLUND CO., Dept. D, Manchester, Conn., manufacturers of the original helical taper pin reamer. Their Helical Die Makers Taper Reamer is made with the taper which gives the correct clearance in piercing dies. These reamers cut rapidly and are often used as milling cutters for profiling. Specifications and prices of Single-End and Double-End End Mills are given. These End Mills are furnished with left-hand spiral, right-hand cut; or right-hand spiral, left-hand cut.
INFORM-A-GRAM KEY No. D97-Z

AUTOMATIC DRILLING UNITS are featured in a 4-page illustrated folder issued by the GOVRO-NELSON CO., Dept. D, 1931 Antoinette St., Detroit 8, Mich. A few typical applications of these adjustable units are shown. Their sensitive feed rate automatically retards feed to compensate for dull tool or hard material, thereby practically eliminating breakage. Because of their compact size, these units permit exceptionally close assembly for simultaneous multiple drilling, and operate in any plane or angle.
INFORM-A-GRAM KEY No. E8-Z

FINE INSTRUMENT SCREWS manufactured by the WALTHAM SCREW CO., Dept. TD, Waltham, Mass., are featured in a booklet issued by the company. Inserts made according to customers' drawings or specifications are supplied for the plastics industry. Waltham manufactures the entire range of machine screws and nuts specified by the U. S. Army Air Corps Materiel Division and accepted as standard throughout the industry.
INFORM-A-GRAM KEY No. E4-Z

ELECTROSTATIC PAINTING PROCESSES is the title of an illustrated booklet available without charge from HARPER J. RANSBURG COMPANY, Dept. TD, Electric Coating Division, 1200 Barth Ave., Indianapolis 7, Indiana. The booklet gives a comprehensive idea of how the electrostatic spraying process works, the wide variety of products on which this method of finishing may be used and the advantages of the method from the standpoint of economy in paint costs as well as improved results.
INFORM-A-GRAM KEY No. E5-Z

CENTRALIZED LUBRICATION SYSTEMS, which increase the production output of machinery and at the same time make impressive savings in time, power and lubricating materials, is the theme of Bulletin No. 25 published by the FARVAL CORP., Dept. J, 3295 E. 80 St., Cleveland 4, Ohio. This 16-page booklet is a graphic portrayal of the theory and practice of mechanical lubrication. A study of the machinery lubrication problem and of the economies that are inherent in a system which delivers lubricant to all bearings in exact measured amounts regardless of location is presented. A large close-up of a Farval Manual Dualine System at work is shown.
INFORM-A-GRAM KEY No. 413-Z

START WITH WHISTLER ADJUSTABLE DIES
TO REDUCE MANUFACTURING COSTS

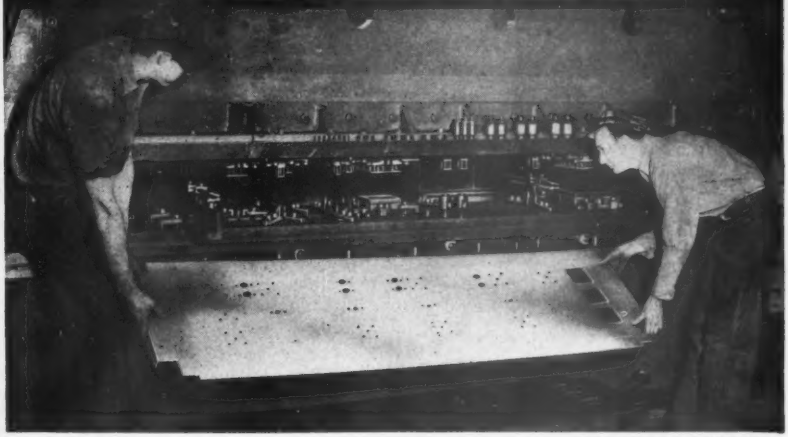
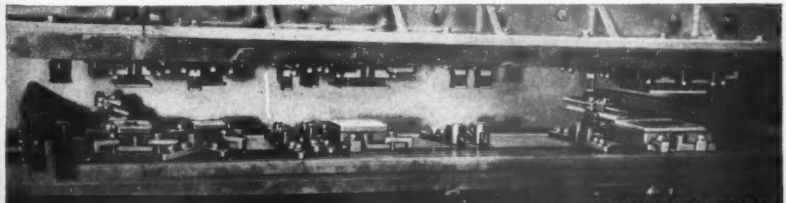


PHOTO COURTESY LAGANKE ELECTRIC CO.

If perforating, notching, slitting or rounding dies are used in the manufacture of your products then you should know the time and money saving advantages of WHISTLER MULTI-USE ADJUSTABLE DIES

Write for Whistler Catalogs. Send blueprint or details of your perforating jobs without obligation.

Continued re-use in different groupings, punches and dies from stock in standard sizes and shapes to 1½" diameters, complete interchangeability of all parts, absolute precision in operation, are but a few reasons why Whistler Adjustable Dies are serving top flight manufacturers throughout the country. Work on materials to ¼" mild steel and in practically every type press. Closer centers reduce press operations. Special sizes and shapes to order in a minimum of time and can be used in combination with stock units. 28 years experience in the development of time and money saving die equipment makes it good sense to get in touch with Whistler.



S. B. WHISTLER & SONS, Inc. 752-756 MILITARY ROAD BUFFALO 17, N. Y.

PUBLICATION PREVIEWS

FELT WHEELS & BOBS are described in an illustrated folder issued by the DIVINE BROTHERS CO., Dept. DJ, Utica 1, N. Y. These felt wheels are available in several different degrees of hardness. They are suitable for use on very soft or ductile metals such as aluminum, tin, or zinc or extremely hard metals such as steel castings or forgings. They are excellent for removing fins from plastics molded parts.
INFORM-A-GRAM KEY No. B10-Z

CARBIDE TIPPED MACHINE CENTERS are described in a stock tool Bulletin, No. 137, recently published by TUNGSTEN CARBIDE TOOL CO., Dept. T, 2661 Joy Rd., Detroit 6, Mich. These centers are listed in Morse Taper Numbers 1 through 5; in Brown & Sharpe Taper Numbers 7 through 11; and in Jarno Taper Numbers 4 through 12. Such common sizes as Morse Taper Numbers 2, 3 and 4; Brown & Sharpe Taper Numbers 7, 9 and 10; and Jarno Taper Number 6 are carried in stock ready for immediate shipment. All of the centers listed in the bulletin are tipped with Carboloy Grade 44A carbide.
INFORM-A-GRAM KEY No. 887-Z

TEMPERATURE CONTROL SYSTEM, designed especially to bring to electrically-heated units a regulation of heat-input, is described in a 25-page publication issued by the LEEDS & NORTHRUP CO., Dept. T, 4934 Stenton Ave., Philadelphia 44, Pa. It explains how, by means of an "on-off" contacting system, the heating unit is fed the electric current needed to keep temperature to the required control point or program. Schematic illustrations show the reader how control action is obtained by regulating the proportion of time during which current is "full on" and "full off". Installation photos show the control system in use in representative plants. Also included is an explanation to show how easily an operator can "tune" the control to his particular process.
INFORM-A-GRAM KEY No. 360-Z

CHECKING PLATE FIXTURES are presented in an illustrated 6-page bulletin published by MASTER INDUSTRIES, INC., Dept. DJ, 709 E. 38th St., Indianapolis 5, Ind. These fixtures are so designed that angle blocks and other accessories usually used on a surface plate can be eliminated. Instead, bench centers, riser plates, angle plates and a vertical riser bar for holding work at any angle between centers, all mounted from the accurately scraped back side of the plate, are furnished in the Standard Unit. In addition, a 20" Universal Sine Bar Unit which also mounts on this scraped back of the plate is furnished making it possible to check angle and taper work, between centers or in "V" blocks with extreme accuracy. By use of this Sine Bar, ring gages for checking taper plug work can, in most cases, be eliminated.
INFORM-A-GRAM KEY No. E7-Z

"THREAD-ALL" TAPPER, a device for tapping and threading which is easily installed on any drill press to provide a precision tapping machine, is described in a 4-page illustrated bulletin issued by the GRUEN GAUGE CO., Dept. J, 10039 Marcus Ave., Detroit 13, Mich. These units, because of their unretarded action of spindle, will handle very small taps without the fear of breakage, and the present manufactured sizes will also drive taps up to 1¾" size with ease. This versatile machine may be used for drilling, reaming, etc., without adjustment and precision tapping is performed without the need of lead screws.
INFORM-A-GRAM KEY No. E6-Z

PROFILOMETER EQUIPMENT is described and illustrated in an 18-page catalog published by PHYSICISTS RESEARCH CO., Dept. T-9, 343 S. Main St., Ann Arbor, Mich. Specifications and prices are given for the Profilometer and its accessories for measuring surface roughness. The catalog also contains four pages of information on the nature of surface roughness, and a non-technical description of how the Profilometer measures it for production inspection purposes.
INFORM-A-GRAM KEY No. 773-Z

NEW ELECTRODE WELDS COPPER METALS with AC and DC current. Known as EutecTrode 28, it is a coated special bronze alloy to be used for the arc welding of bronze, brass and copper. A procedure sheet on the proper use and application of EutecTrode 28, and a photograph of a welding job done with this new electrode, are available upon request from the EUTECTIC WELDING ALLOYS CO., Dept. TA-2, 40 Worth St., New York 13, N. Y.
INFORM-A-GRAM KEY No. 81-Z

RESILIENT WATERPROOF COATING which shields like a rubber blanket is described in literature available from the CONTINENTAL ASBESTOS & REFINING CORP., Dept. J, 1 Madison Ave., New York 10, N. Y. This material, called Liquinoleum, is now being widely used for roofs, walls, and other surfaces exposed to the elements and offers about eight times the protective thickness of paint. It is resilient, elastic and highly resistant to extremes of temperature. Even after long exposure it will not crack, blister, or alligator.
INFORM-A-GRAM KEY No. D98-Z

"BIG NEWS IN LACQUER" is the title of a small 8-page non-technical leaflet issued by the HERCULES POWDER CO., INC., Dept. TD, Wilmington 99, Del. This leaflet lists the important factors responsible for the developments of the new high-solids lacquers, the

Hy-Draulic SHAPER-PLANERS

HAVE THE EXACT SPEEDS AND FEEDS YOU NEED FOR THAT WORK YOU WANT TO DO FAST.

Cutting speeds and feeds are quickly and infinitely adjustable, within specified limits, in Rockford Hy-Draulic Shaper-Planers. There's every convenience for quick set-up and easy operation. Cutting pressure is uniform throughout each chip thus working cutting tools to maximum capacity. Table returns "on the double" after a smooth shockless reverse.

Maintenance is simple and easy in the Rockford Hy-Draulic Shaper-Planer. Tool cost is very low. Easy operation saves time, manpower and horsepower. Because the drive is *hydraulic*, the Shaper-Planer table cannot slide off the bed and cause damage, and it can stall under cut without harm to cutting tool or machine.

There's a wide field of planing in which the Hy-Draulic Shaper-Planer is unbeatable for getting out accurate work fast. Write today for details.

Ask for Bulletin 2505.

4501

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

PUBLICATION PREVIEWS

advantages of using them, and includes a short history of the development of lacquer as a protective coating.
INFORM-A-GRAM KEY No. A93-Z

MASTER FEED FINGERS with Adjustable Tension are discussed in a revised bulletin recently issued by HARDINGE BROTHERS, INC., Dept. TD, Elmira, N. Y. The bulletin includes the addition of the Biax Adjustable Tension Masters for No. 00G Brown & Sharpe Machines and the DA-2X Adjustable Tension Masters for ½" capacity Davenport Automatics which Hardinge now furnishes. Illustrated are the standard pads for different sizes of stock which are available in hardened steel, nickel cast iron and bronze material and are interchangeable in Hardinge Style "B" Master Feed Fingers.
INFORM-A-GRAM KEY No. 582-Z

EUREKA ALLOY WELDING ELECTRODES are detailed in an 8-page leaflet just issued by WELDING EQUIPMENT & SUPPLY CO., Dept. J, 223 Leib St., Detroit 7, Mich. Heat Resisting Alloy, Bronze, Copper, Copper-nickel Alloy, Cast Iron and "Drawalloy" welding electrodes are described. The recommended uses and procedures for applications are also outlined. Eureka No. 332 Electrodes are desirable for welding or reconditioning equipment composed of heat resisting alloys such as retorts, furnace linings and parts, conveyors, carburizing pots, annealing pots, etc. They are recommended for applications requiring toughness, resistance to oxidation, nitriding and carburization. Manganese and phosphorus bronze, brass and copper are successfully welded with No. 50 Bronze Electrodes.
INFORM-A-GRAM KEY No. 580-Z

DIE CASTING MACHINES which produce extremely dense homogeneous castings are featured in an 8-page booklet issued by LESTER-PHOENIX, INC., Dept. D, 2711 Church Ave., Cleveland 13, Ohio. Their Series 3 Die Casting machines have a rigid, non-elastic U-shaped beam type frame which enables high injection pressures to be confined and sustained. They produce aluminum or brass die castings up to 10 pounds and magnesium die castings of like displacement by high pressure cold chamber injection, and die castings of zinc, lead and tin alloys up to 19 lbs by submerged gooseneck injection.
INFORM-A-GRAM KEY No. 425-Z

WELDON TOOLS are pictorially described in Catalog 8-B, containing 78 pages, published by The Weldon Tool Co., Dept. T, 3000 Woodhill Road, Cleveland 4, Ohio. This catalog covers their complete line of Single and Double-end End Mills in both right and left hand spiral flutes, Ball End Mills, Corner Rounding End Mills, "Tu-Lip" Counterbores, T-Slot Cutters, Jig Borer End Mills and Holders, and Quick Change Adapters and Holders for milling machines. Under a Special Tools section are shown ground circular, flat and end cutting form tools, also formed milling cutters. This section contains useful formulae and tables including speeds for Weldon End Mills.
INFORM-A-GRAM KEY No. 517-Z

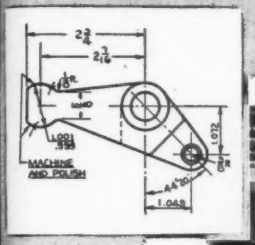
TOOL TIPS is the title of an informative bulletin (Vol. 20, No. 2) published by the EX-CELL-O CORP., Dept. T, 1200 Oakman Blvd., Detroit 6, Mich. Illustrated are various views of a Taper Inspection Plate recently built by Ex-Cell-O that will have practical interest for tool rooms and inspection departments in every large shop. This is ideal equipment for checking taper drives and all types of tapers within its range. Their thread grinder and special attachments for grinding many surfaces concentrically at one setting are also pictorially described.
INFORM-A-GRAM KEY No. 737-Z

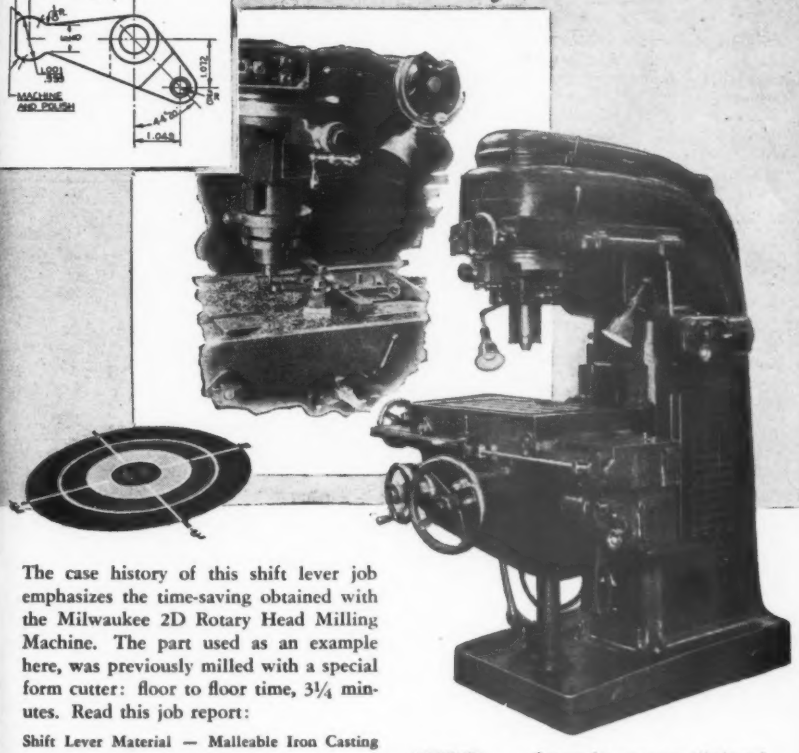
HARD FACING ALLOYS & OVERLAY METALS are pictorially described in Catalog 75 published by the WALL-COLMONOY CORP., Dept. D, 720 Fisher Bldg., Detroit 2, Mich. Colmonoy Sweat-on Paste has the greatest abrasion resistance of all Colmonoy hard-facing materials and outwears ordinary hard metals several times. This metallic hard-facing paste, compounded with a suitable flux binder which does not deteriorate through drying, can be brought back to its original consistency by the addition of water.
INFORM-A-GRAM KEY No. 849-Z

CARBIDE TIPPED DRILLS for hardened steel are featured in a 4-page bulletin published by the GORAL TOOL CO., Dept. TD, 5020 E. McNichols Rd., Detroit 12, Mich. The Goral drill can be run at the same speed you run an ordinary drill. Longer tool life and better results are obtained by using water. With this method drilling you do not anneal part around the hole being drilled. The result is that the hole is just as hard as the rest of the part. Goral carbide tipped twist drills hold their cutting edges over long periods of use when cutting cast iron, aluminum, bronze, brass, copper, brake lining, asbestos or plastics. This makes them ideal for use in modern automatic machines where tool change down time is a prime factor.
INFORM-A-GRAM KEY No. E10-Z

HAND-CUT ROTARY FILES are detailed in an illustrated booklet issued by THE ROTARY FILE CO., Dept. T-4, Stratford, Conn. These files are used in a wide diversity of power-driven machines—portable or stationary—where filing, reaming, or finishing operations are required. They are employed from roughing to smooth-finishing and for surface-abrading. They work satisfactorily on ferrous and non-ferrous metals.
INFORM-A-GRAM KEY No. B9-Z

Can you Save 1½ Minutes on Each Shift Lever?





The case history of this shift lever job emphasizes the time-saving obtained with the Milwaukee 2D Rotary Head Milling Machine. The part used as an example here, was previously milled with a special form cutter: floor to floor time, 3¼ minutes. Read this job report:

Shift Lever Material — Malleable Iron Casting

Operation — Mill 1" diameter

Number of Pieces — lots of 300

Initial Setup Time — 20 minutes

Rough and Finish Mill — Stock removed ⅛" on the diameter

Floor to Floor Time — 1¾ minutes

Check these advantages of the Milwaukee Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills intricate shapes in a single set-up without the aid of templets or models — transmitting blueprint dimensions and outlines directly to the workpiece.

ACCURATE . . . chances for error are eliminated because there is no change in setup. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST . . . initial job preparation and setup time are reduced to the minimum. Accurate performance of the machine saves operator's time and results in rapid production of work otherwise difficult to perform.

Write for Bulletin No. 1002C and complete information.

KEARNEY & TRECKER

Products

CORPORATION

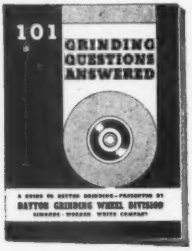
Milwaukee 14, Wisconsin

Subsidiary of Kearney & Trecker Corporation

BUILDERS OF MILWAUKEE ROTARY HEAD MILLING MACHINE • FACE MILL GRINDER • AUTOMETRIC JIG BORER • SPEEDMILL • MIDGETMILL • CENTER SCOPE.

PUBLICATION PREVIEWS

GRINDING PROBLEMS are discussed in a new portfolio entitled "101 Grinding Questions Answered" published by the Dayton Grinding Wheel Division of the SIMONDS WORDEN WHITE CO., Dept. TJ, 839 Negley Place, Dayton 7, Ohio. Indexed for quick and ready reference, this portfolio is a worthwhile addition to any manufacturer's handy library, especially for those having



frequent grinding problems that cause production delays until the correct answers are obtained. The company has started an information service which is available to any person or firm having grinding problems to be solved. No obligation is entailed in submitting the grinding problem for which an answer will be given following a careful study.
INFORM-A-GRAM KEY No. D37-Z

TRIPLE-A PROTECTIVE COATINGS, specifically formulated not only to protect but also to decorate iron, steel, wood, brick, concrete and all other surfaces are fully described in the new Triple-A Catalog and Color Card issued by QUIGLEY COMPANY INC., Dept. J, 527 Fifth Avenue, New York 17, N. Y. Corrosion of metals, rotting of wood, disintegration of concrete resulting from moisture and often augmented by acid or alkaline conditions such as salt in sea water and brines, chlorine fumes, sulphurous gases from burning coal, soot, electrolysis, high heat and many fungi—all these distinctive influences that contribute to the rapid destruction of surfaces have long been the subject of intensive research by the Quigley laboratories. The broad Triple-A line, with its several new "numbers", now includes a special finish designed to give maximum protection to all of the many and varied structural surfaces in every type of industry.
INFORM-A-GRAM KEY No. D76-Z

REPUBLIC THREAD GAGES, including the new V-Nide gage and plug gages are treated in two new pamphlets published by REPUBLIC GAGE CO., Dept. T, 2228 Fenkell Ave., Detroit 21, Mich. The controlled accuracy of these gages makes their use invaluable for assured interchangeability of parts, for reducing rejections, increasing production speed and saving material and man-hours. Thread forms such as American National, Whitworth, Pipe (straight or taper), Acme, Buttress, etc., are produced in Republic Gages which all conform to N. S. T. C. standards unless otherwise specified. The V-Nide gage has all the best features of high speed steel, plus greatly increased wear life.
INFORM-A-GRAM KEY No. 923-Z

DIE HOLDERS AND CHUCKS are presented in Catalog No. 5 published by the ALCO TOOL CO., Dept. T, 152 Birdseye St., Bridgeport 4, Conn. Their Releasing Model Button Type Die Holder with adjustable concentric alignment is recommended for use on hand screw machines and turret lathes. The Alco Drill Chuck will hold the drill securely under the most severe conditions without the use of bushings. It will fit any screw machine and is quickly adjustable by means of a wrench only to any size drill within its range.
INFORM-A-GRAM KEY No. 180-Z

WET TOOL GRINDERS are featured in a series of bulletins published by the J. G. BLOUNT CO., Dept. J, Everett 49, Mass. The Blount Combination Wet Tool Grinder has been designed for wet and dry grinding and may also be used as a snagging grinder. The Model F-20" Wet Tool Grinder has been redesigned to accommodate an adjustable table, specially developed for fast rough grinding of Tungsten Carbide tipped tools.
INFORM-A-GRAM KEY No. 213-Z

SAND-O-FLEX, a brush type sanding and finishing wheel for sanding, burring and finishing wood, metal, plastics, fibre, rubber products and special materials is a product of SAND-O-FLEX CORP., Dept. DJ, 4373 Melrose Ave., Hollywood 27, California. It was designed by tool engineers to meet the needs of cabinet makers, automobile and furniture finishers, owners of model and experimental shops, mold lofts and home workshops, for an inexpensive, time saving, practical sander that requires no particular skill or aptitude to operate. It is particularly effective on irregular surfaces, around corners, or for the hard-to-get-at job. Because of its light weight, the Sand-O-Flex is an ideal tool for use on flexible shafts or portable electric tools. It is available in two sizes which fit any ½" or ⅝" motor shaft and the tightening of two set screws makes it ready for operation. A ¼ hp electric motor will handle all normal jobs; motor speed of 1750 rpm is recommended. Any type of abrasive

Only a few minutes' *Set-Up Time*

and you're ready to make a

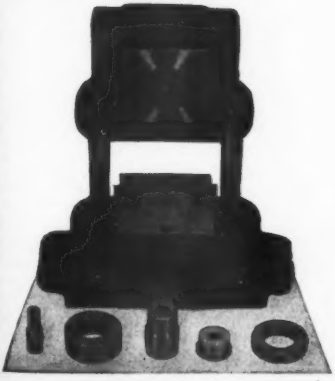
NEW SIZE WASHER

when you use...

HOVIS

UNIVERSAL MASTER

WASHER DIES



Once having made a nominal investment in Hovis Master Washer Dies to fit your requirements, all you need is to change five small easily removable parts to make a new size washer. This takes only a few minutes. Think of what this means in the saving of time, materials, process engineering, tool designing and tool tryout! And you can make washers on short notice as you need them, avoiding large inventories. The Master Dies themselves do not become obsolete. USE THEM FOR PRESENT AND POSTWAR PRODUCTION. Write for illustrated folder.

← Made in 5 sizes:

$\frac{3}{4}$"—1$\frac{1}{2}$"—2$\frac{1}{2}$"—4"—6".

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD
Phone: Centerline 1575

VAN DYKE, MICHIGAN
Suburb of Detroit

PUBLICATION PREVIEWS

such as metallite cloth, garnet cloth in various grits and grades and crocus cloth are available especially packaged for Sand-O-Flex.
INFORM-A-GRAM KEY No. D80.5-Z

SPECIAL TUNGSTEN CARBIDE DIES are the subject of an illustrated bulletin, first in a series of bulletins to be published by Carey-McFall Company, Dept. DJ, 2156 East Dauphin St., Philadelphia 25, Pa. It also concerns their applications of tungsten carbide to cutting tools, special tools and gages. Carey-McFall have been making precision dies for over twenty years and their shops are prepared to grind and lap tools to tolerances of .00002" and to finish them within 1 to 2 micro-inches. The life of tools is vastly increased by tungsten carbide which can be used for tipping machine parts, molds, mandrels, special tools, gages, or wherever it is desirable to establish extreme accuracy and long life with resistance to wear, abrasion or corrosion.
INFORM-A-GRAM KEY No. D86-Z

BROACH SHARPENER BULLETIN, No. CS2-44, illustrating its new broach sharpeners has been issued by COLONIAL BROACH CO. Dept. D, Box 37, Harper Station, Detroit 13, Mich. These sharpeners built in two sizes have been designed for sharpening round and flat broaches; spline and serrated types; etc., from the smallest size up to broaches 7' long and having a maximum diameter of 6" (8" maximum width for flat broaches). By providing a rapid and accurate means for maintaining original tooth form and cutting effectiveness in broaches, this machine makes it possible for shops to do their own broach sharpening, thereby eliminating time lost in returning broaches to manufacturers for this operation. The booklet contains descriptions of the machines' lubrication system, electrical controls, and complete general specifications for the two sharpeners together with lists of standard and extra equipment offered.
INFORM-A-GRAM KEY No. 26-Z

EXTRUSION PRESSES for non-ferrous metals are pictorially described in a 4-page leaflet issued by the SCHLOEMANN ENGINEERING CORP., Dept. TD, 1100 Empire Bldg., Pittsburgh, Pa. These presses were designed for the efficient extrusion of tubular products, rods, bars and all types of sections, strip and wire rods. A 4,000-ton press viewed from control side is shown in operation extruding aluminum alloy and a 2,500-ton press is shown assembled in the shop for inspection prior to shipment. Temperature control of the containers in these presses is made possible by an exclusive Schloemann development.
INFORM-A-GRAM KEY No. D85-Z

GEARS, made to your specifications, are featured in a picture catalog released by the FAIRFIELD MFG. CO., Dept. J, 301 S. Earl Ave., Lafayette, Ind. Their Hypoid Gears are processed in full range from 1½" to approximately 16" in diameter; size limitations depend upon design. Splined Shafts are available on order in lengths up to 45" and in diameters from 1" to 6". Helical, Worm, Herringbone, Spur, Zerol, Spiral Bevel and Straight Bevel Gears are illustrated along with Differentials and Splined Shafts, and size limitations are given for each type.
INFORM-A-GRAM KEY No. D89-Z

RADIAL DRILLING & TAPPING MACHINES are described in an illustrated 4-page bulletin released by the BAUSH MACHINE TOOL CO., Dept. TD, Springfield 7, Mass. These machines are desirable for single spindle drilling and countersinking with automatic depth control for lead screw tapping, in which faster work is made possible, with less rejections, by an automatic electric counting switch and automatic return. Weighing 3500 lbs. net they have eight spindle and lead screw assemblies. A quick change-over from one operation—or spindle size—to another is possible.
INFORM-A-GRAM KEY No. 204-Z

INDUSTRIAL INSPECTION FACILITIES of TRIPLETT & BARTON, INC., Dept. TD, Burbank, Cal., are featured in an illustrated booklet available from the company. It contains pictorial discussions of metallurgy, electronics, radiography, chemical analysis, engineering and physical testing, and describes the facilities offered by Triplett & Barton in each case. The Triplett & Barton Specific Inductance Comparator is used, for example, to ascertain the dielectric constant and power factor of various dielectrics. The machine is capable of comparing a known dielectric with an unknown sample. Micrometer adjustments and a special circuit, which eliminates edge effects, permit an unusually high degree of accuracy.
INFORM-A-GRAM KEY No. D77-Z

TOOLITE, a thermosetting phenolic plastic for casting tools, dies and fixtures, is illustrated in a descriptive folder available from ADHERE, INC., Dept. T, 1220 Maple Ave., Los Angeles 15, Calif. Toolite is now being used in aircraft tooling. Its unusual properties make it suitable for many production tools, such as hydropress dies, stretch press forms, sinking dies, drill jigs, router blocks and checking fixtures. This liquid casting compound, requiring only the addition of catalyst or setting agent, is poured into a mold and baked in an oven, forming a durable, rigid casting.
INFORM-A-GRAM KEY No. 980-Z

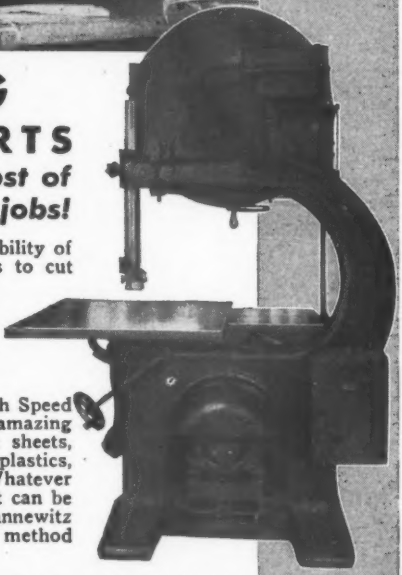
MULTIFLEX COUPLINGS designed to compensate for angular and parallel misalignment, are cushioned in water and oil-resistant rubber. No lubrication is necessary; end

The SUPER METHOD

of TRIMMING FORMED PARTS

and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.



Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.

FRICTION SAWING

with Tannewitz

HIGH SPEED BAND SAWS

WRITE FOR YOUR FREE COPY

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

float is unobstructed. They absorb heavy shock and pulsating loads in any direction, with absolute protection against dirt, grit or water. New in principle, these couplings are featured in a 4-page descriptive booklet published by the AUTOMATIC MACHINE & TOOL CO., Dept. J, 132 Charles St., Auburndale 66, Mass. The rubber center member of Multiflex Couplings is made up of two specially constructed metal driving parts molded into the rubber and spaced to distribute the load evenly throughout the flexible center. This gives the coupling its ability to absorb angular and parallel misalignment as well as shock loads in any direction.
INFORM-A-GRAM KEY No. 71-Z

AIR-ACTUATED TOGGLE CLAMP is illustrated in a descriptive folder issued by AIROP, INC., Dept. TD, 12841 Ford Rd., Dearborn, Mich. Photographic reproductions of applications of the Airop, the range of installations, principal features, and a blue print of construction, along with prices, are included. In drilling and reaming operations much time loss can be avoided if operator can use a foot control instead of a hand control in the clamping of parts. Airop clamps free both hands for other operations.
INFORM-A-GRAM KEY No. D64-Z

ELECTRODE COMPARISON CHART, a comparison chart of welding electrodes which is probably the most complete tabulation available has just been released by the Allis-Chalmers Manufacturing Co., Dept. TD, Milwaukee 1, Wis., and may be obtained upon request for Bulletin B6344A. Comparing the equipment from 22 electrode manufacturers, the 8-page bulletin contains information on stainless steel and hard surfacing electrodes, as well as the mild steel type. A section is devoted to a typical weld deposit analysis of stainless steel electrodes, showing the percentages of chromium, nickel, carbon, columbian and molybdenum.
INFORM-A-GRAM KEY No. 183.5-Z

INTERNAL SURFACE INSPECTION—Bulletin 10 issued by the INTERNAL SURFACE PROJECTOR CO., Dept. TJ, Mineola, N. Y., is descriptive of equipment and methods for inspection of internal surfaces by optical projection. The Soetbeer Internal Surface Projector is a machine for microscopically inspecting the internal surfaces in cylinders and projecting a magnified image upon a ground glass screen for visual observation. Aircraft engine cylinder walls, for example, may be inspected to disclose important data concerning surface conditions and characteristics; cracks, spots and deposits; grinding and honing patterns; effects of chrome plating; determination of degree of porosity; determination of ring face compatibility; effects of temperatures; and general inspection data in a most practical, speedy and convenient manner to facilitate the making of records and charts for guidance, and to provide a constant quality check. The machine includes means for making photographic records of the inspected area. The bulletin has detailed constructional data, cutaway views and specifications, full operating instructions for visual and photographic techniques, and a coded list of parts.
INFORM-A-GRAM KEY No. D61-Z

ACCURACY INSPECTION EQUIPMENT consisting of surface plates, angle irons and straight edges made of Meehanite are presented in an illustrated bulletin published by the BARCO SCRAPING CO, Dept. D, 1975 E. 65th St., Cleveland 3, Ohio. Since the exclusive octagon-ribbed base of the Barco Surface Plate does not reach to the edge, jigs, fixtures and work can be easily clamped to the bottom. Barco Straight Edges are handscraped to a .0002" flat tolerance. The Angle Irons promote accuracy of measurement in connection with boring, drilling, milling and grinding operations, as well as on shapers, planers and like equipment.
INFORM-A-GRAM KEY No. 154-Z

"YOUR GUIDE TO FASTER, BETTER MARKING" is the title of Catalog Supplement No. 43 published by the NOBLE & WESTBROOK MFG. CO., Dept. DJ, East Hartford, Conn. Briefly shown are some of their marking, knurling, numbering and graduating equipment. Besides providing sharper, clearer, permanent impressions, Noblewest High-Speed Precision Marking Machines embody such features as automatic marking and unloading, pneumatic pressure, counters, safety devices, interchangeable marking dies and work-holding dials.
INFORM-A-GRAM KEY No. 161-Z

MAN-AU-TROL VERTICAL TURRET LATHES are discussed in a 14-page booklet published by the BULLARD CO., Dept. TJ, Bridgeport 2, Conn. While at present confined to the Bullard Vertical Turret Lathe and a new Bullard horizontal machine, this automatic control equipment is capable of handling any machining work where drilling, boring, turning, facing, reaming and sundry other operations and functions can be predetermined. It can be set to control direction of movement irrespective of sequence. It makes possible indefinitely precise repetition of work dimensions. It is efficient either on job lots or single piece work because of its ability to change instantly from an automatic to a conventional manually-operated machine.
INFORM-A-GRAM KEY No. 220-Z

DIEING MACHINES for high production stamping from progressive dies utilizing roll feeds are fully illustrated and described in a

MOTORIZE

LATHES
MILLING MACHINES
DRILLS
BORING MILLS
SHAPERS
ORIGINAL EQUIPMENT
KEY SLOTTERS
GEAR HOBBERS

with

LIMA GEARSHIFT DRIVES

½ to 20 hp Capacities

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REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES - LIMA ELECTRIC MOTORS
LIMA MAGNETIC POLISHING LATHES - LIMA PEDESTAL GRINDERS

PUBLICATION REVIEWS

34-page catalog issued by the HENRY & WRIGHT MFG. CO., Dept. D, Hartford, Conn. Features incorporated in these machines are: a low center of gravity, allowing high speed with a minimum of vibration; a maximum guiding surface, including a four-post guide to punchholder; a pulling stroke applied to the die instead of the usual pushing stroke. Additionally the flywheel, crankshaft and connection are located below the punchholder instead of above.
INFORM-A-GRAM KEY No. 316-Z

WIRE MESH PRODUCTS are featured in an illustrated 6-page pamphlet issued by the C. O. JELLIFF MFG. CORP., Dept. TJ, Southport, Conn. Descriptions of the various special alloys and metals used in Jelliff mesh are included along with photographs of the more popular weaves. The company also issues an engineering data book and price list covering industrial wire cloth. A definition of terms and an outline of recent outstanding wire mesh developments are given.
INFORM-A-GRAM KEY No. 861-Z

MAGNETIC-AUTOMATIC COOLANT CHIP SEPARATORS for honing and grinding machines are pictorially described in Bulletin 151-C just issued by the BARNES DRILL CO., Dept. T, 814-830 Chestnut St., Rockford, Ill. Available in 10, 20 and 40 gallon per minute coolant capacities the separators magnetically attract and remove automatically from the coolant-solution the magnetic swarf and most of the entrained abrasive particles, thus permitting repeated use of the cleaned liquid coolant.
INFORM-A-GRAM KEY No. C60-Z

WET BELT SURFACERS and Automatic Feed Tables are pictorially described in an illustrated 8-page bulletin published by the PORTER-CABLE MACHINE CO., Dept. TDJ, Syracuse 8, N. Y. These Precision Surfacers are versatile; in addition to working flat surfaces, arcs are generated, and bevels, angles and other shapes are quickly and accurately machined free hand or with simple jigs. The Automatic Feed Table speeds the operation of Porter-Cable BG-8 Wet Belt Surfacers; controls the pressure and the rate of feed automatically, reaches the maximum rate of production, obtains the finish desired uniformly and frees the operator during the machining operation to prepare for the next cycle.
INFORM-A-GRAM KEY No. 14-Z

STAINLESS STEEL FASTENING DEVICES are presented in a comprehensive, 83-page engineering catalog just issued by ALLMETAL SCREW PRODUCTS CO., Dept. T, 35 Greene St., New York 13, N. Y. This book is designed to assist designers, engineers, and other plant executives in selecting the right size and type of non-corrosive fastening device for any particular job. Included in this manual is a brief introduction to stainless steel, stock sizes and physical dimension of various bolts, cap screws, nuts, pipe fittings, etc., and several pages on special screw machine parts that can be made to order. The book also has an extensive section devoted to engineering tables and data.
INFORM-A-GRAM KEY No. D90-Z

THOMAS TAP EXTRACTOR and Metal Disintegrator is described in two illustrated 4-page folders available from the CLINTON MACHINE CO., Dept. TD, Clinton, Mich. Their "Hand Portable De Luxe" Model works effectively in broken small tools embedded in steel, aluminum, cast iron, magnesium, bronze, brass, plastics, etc. Designed especially for precision "arc-boring" in small tool and die shops or production shops, it removes broken or imbedded taps, drills and studs without damage to critical workpieces.
INFORM-A-GRAM KEY No. C35-Z

JACOBS SUPER CHUCKS, "N" series, ball bearing, are described in bulletin 45-N, recently released by THE JACOBS MFG. CO., Dept. TD, Hartford 1, Conn. An inserted thrust race with a continuous deep groove and a heat treated alloy steel nut which supplies four times the former load carrying capacity, are special new features of Jacobs "N" series Super Chucks. They are available only in heavy duty tapered models for the drilling machine, radial drill, milling machine, lathe, turret lathe and screw machine, to which chucks are fitted by means of straight shank or tapered arbors. Besides being mountable on an arbor or adapter, which fits the machine spindle, each Super Chuck has a hole for mounting it directly on the machine spindle. The hollow taper and straight shank arbors and motor shaft adapters, designed so that each one will accommodate a specific model of the Super Chuck, are also available from The Jacobs Mfg. Co.
INFORM-A-GRAM KEY No. D87-Z

LOGAN LATHES is the title of an informative booklet about lathes and a wide line of lathe accessories, published by LOGAN ENGINEERING CO., Dept. TD, 4901 W. Lawrence Ave., Chicago 30, Ill. Among the products all clearly illustrated and described, are: Quick Change Gear Lathes, equipped with the Logan Quick Change Gear Box which provides 48 threads and feeds in either direction to the carriage of the lathe; a ⅝" capacity Hand Screw Machine; Quick Change Gear and Manufacturing Turret Lathes and Back Geared Screw Cutting Lathes. Accessories include everything necessary for the most efficient and advantageous use of these sturdy, durable, multi-purpose machines.
INFORM-A-GRAM KEY No. 2-Y

FAST, UNIFORM PART MARKING...

If the metal parts you manufacture require accurate marking or numbering for easy identification, this improved Mercury Type Holder is an outstanding help in *simplifying* your marking job!

This tool holds the *entire part number*—up to 20 characters if needed. Each character is rigidly aligned and held in place so that, with a single blow of a hammer, the entire number is clearly and neatly stamped on the part. It's fast, fool-proof—and entirely eliminates the time normally consumed when using dies for each separate letter or figure. Moreover, such common errors as wrong sequence, strike-overs, overlapping numbers, etc., are no longer a problem with the Mercury method!

And here's an outstanding feature: the Mercury Holder accommodates five type sizes, and all type is quickly interchangeable to meet a whole range of numbering needs. So, with even a single Holder and a selection of type sizes, you can be ready for any numbering job that comes along! The Mercury Holder is compact, important when working with small parts . . . it is of all-steel *machined* construction for long life . . . it has just *four* simple parts . . . and it has many other important features you should know about. Hardened and ground hand cut steel type is available in a full range of sizes.

Full details, including ordering data and specifications for both hand and press style holders, are available for the asking. Write Department D today!

IMMEDIATE DELIVERY!

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546 EAST 16TH STREET, LOS ANGELES 15, CALIFORNIA

Model JA

NEW IN DESIGN

The Model JA is new in design both inside and outside. In it are utilized fewer parts, and they are made of Magnesium and Aluminum for extreme featherweight lightness. The alloy steel shaft diameter is unusually large for sustained smooth and true operation. This means still longer wheel life and better grinding. The speed, as before, is governed at 50,000 R.P.M. and there are selected ball bearings, front and rear. The JA Featherweight is a distinct improvement over all models previously produced by Madison-Kipp, the originators of really high speed grinders. ORDER TODAY!

THE SAME LOW PRICE! $29.75 in U.S.A.

Weight 12 Ounces; Length 6¾ In; Chuck Size ⅛ In. Wheel Guard Removed for Better Illustration

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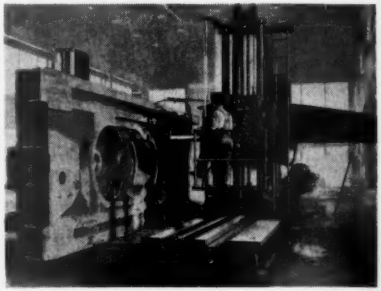
212 WAUBESA ST., MADISON 4, WIS., U.S.A.

Ohio "Dreadnaught" for Boring, Drilling and Milling

The Ohio Dreadnaught Horizontal Boring, Drilling and Milling Machines, made by the Ohio Machine Tool Co., Dept. TJ, of Kenton, Ohio, are available with spindle diameters of 5" and 6", in the table model as well as the floor type, Model 6FA illustrated here. Noteworthy Dreadnaught features are its nitraded



spindle and the anti-friction bearings used throughout, with automatic lubrication and pressure lubrication to all sliding surfaces. Control of the built-in electrically-powered rapid traverse and the start-stop, forward-reverse, run-jog of the spindle is effected by push button control which can be had also as portable or remote control stations. The machines, being constructed in units, have the additional feature of easy accessibility. These units can be supplied with or without bed plate, bar support and attachments, besides various types of auxiliary and compound table units, either power or hand fed. Narrow guide construction is provided for all movable units. All the sliding gears and clutches are of the internal gear tooth type. The spindle has 36 speeds, 18 being selected at the head and the remainder by change gear in the base. Dreadnaught design makes possible a ratio of 1 to 111 between the low and high speeds so that maximum speeds up to 600 rpm are obtainable. Presented in Ohio Machine Tool Company's Bulletin 1000 are the complete specifications of their Dreadnaught with its attachments as well as illustrations of the machine in action.

INFORM-A-GRAM KEY No. 416-Z

New "AD-LIFE" TREATMENT

(ANOTHER ACHIEVEMENT OF PERFECTION TOOL & METAL HEAT TREATING CO.)

Makes even new tools work better. Boosts the efficiency of many tools already hardened . . . resulting in longer runs per grind. Try it on the tools you BUY! (Most of which are hardened by the same methods used twenty years ago).

Recommended for:

Reamers	Drills	Slotting Tools
Milling Cutters	Spot Facers	Rotary Files
End Mills	Form Tools	Cut-offs
Taps	Grooving Tools	Drill Bits
Broaches		Rifling Tools

"AD-LIFE" Treatment is perfectly safe . . . no distortion, breakage, nor size change. The cost of "AD-LIFE" is low and pays dividends in Increased Performance . . . Long Life of Tools . . . and Dollars in Savings.

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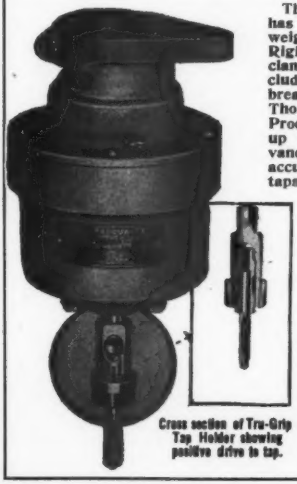
TOOL & METAL HEAT TREATING CO.
1740-58 WEST HUBBARD STREET CHICAGO 22 ILL

For Light Drill Presses

A More Efficient Tapping Head!



Cross section of Tru-Grip Tap Holder showing positive drive to tap.

This special cover clamping model Procunier Tapping Head has been developed for most light drill presses. Removes weight of tapping head from bearings and drill press spindle. Rigid and accurate mounting is secured with fittings which clamp directly around the press quill. Other advantages include no overhang, no tap wobble, longer tap life, less tap breakage, and greater accuracy. Easily attached and removed. Thousands of shops report unusual production records with Procunier because these remarkable heads are built to stand up under the toughest production grind. The exclusive advanced design of the new Procunier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect full or loaded taps by the "feel", or pressure on the clutch, required to drive them, thus avoiding needless tap breakage. With this sensitive Procunier smooth operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to tap loading.

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- ☐ Tru-Grip Tap Holders
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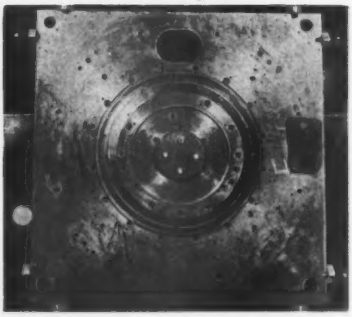

TOOL STEEL TUBING

This jig contains 52 drilling holes, each with a liner bushing of tool steel tubing. With standard bushings not available, tool steel tubing has saved many hours ordinarily spent in boring bar stock.

WRITE NOW!
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Learn how tool steel tubing has saved time, money, manpower and metal for other manufacturers. Maybe you too can use it!

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BISCO
THE BISSETT STEEL CO.
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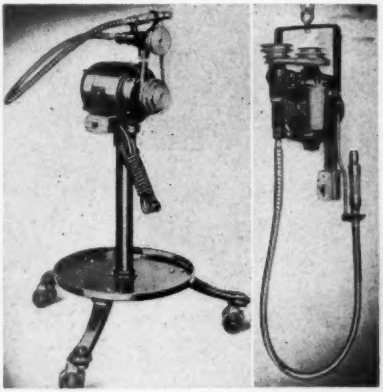
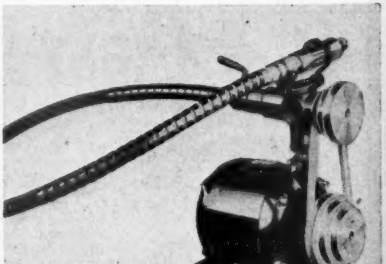
Haskins Flexible Shaft Machines

These machines are available in two general types, i.e., direct drive and multi-speed, countershaft drive from the R. G. Haskins Co., Dept. TD, 615 South California Ave., Chicago 12, Ill. Motor ratings for the standard machines range from ½ hp to 1½ hp. Various arrangements of handpieces and attachments provide for the use of a wide range of tools and accessories. The direct drive machine is ideal where only one speed is required. For an all purpose machine, applicable to different classes of work with various sizes of grinding wheels, wire brushes, sanding drums, buffing wheels, etc., the multi-speed countershaft drive machine is best.





INFORM-A-GRAM KEY No. A70-Z

CRITERION *Boring Heads*

Original Accuracy *Maintained*

Noted for maintaining original accuracy over a longer period Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1¼" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

Lead Screw ground from solid AFTER hardening.

CRITERION MACHINE WORKS
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For marking numbers and letters into name plates, tags, parts, seals, discs, in metal, material, etc.

Write for literature

THE ACROMARKER FOR PERFECT MARKING

Features:

Stamps nameplates up to 9" x 5" x ⅜" thick. Die sizes $\frac{1}{16}$" to $\frac{1}{4}$". Dies are replaceable, and automatic advance permits accurate character spacing. Operating lever requires only a minimum of effort for clean, deep markings.

The ACROMARKER is a remarkably easy-to-operate marking machine offering faster, more accurate marking than heretofore possible. Widely used in industry, this model weighs only 30 lbs. It stamps letters and figures in straight or curved lines. With it unskilled help can do the work of skilled men faster and accurately.

THE ACROMARK CO.
5-15 MORRELL STREET, ELIZABETH 4, NEW JERSEY

(CONTINUED FROM PAGE 134)

Spotwelding Praised in Production of Warplanes

Another engineering weapon from the American arsenal—spotwelding to reduce aircraft manufacturing time, weights, and costs—was revealed before the May 1st Aeronautic Meeting of Buffalo Section, Society of Automotive Engineers. The meeting was one of several held in war production centers to facilitate dissemination of the latest war-engineering information to engineers responsible for the design, development, and production of motorized war equipment.

H. A. Mullen and L. Boelter, of Ford Motor Company's Willow Run Plant, reported that the application of spotwelding techniques to 100 assemblies used in making B-24 bombers has produced savings of 125 man-hours in working time per ship, a corresponding reduction in weight, and a halving of original costs.

The speakers said that aluminum and magnesium alloys and stainless steels now are being welded by batteries of spot, seam, and roll welding machines operated by welding teams. The teams are comprised of new employees, who start spotwelding the first day on the job; of control men, whose decade or more of experience is applied to setting the controls for each battery of 10 welding machines; of job foremen, for each 25 workers; and of a shift division foreman in general charge.

They explained that schedules are standardized to eliminate confusion and to prevent interruption of production through employment of new workers. Teamwork was said to begin with cooperation between the Engineering, Chemical and Metallurgical, and Welding Departments.

Availability of riveting machines which can step up aircraft construction by setting as many as 3,000 rivets an hour, was announced by F. J. Dietrich, of Airplane Division, Curtiss-Wright Corp., Buffalo. Riveting's inherent simplicity and the development of riveting machines, he said, have extended the uses of riveting in aircraft mass production methods.

Development of methods of predicting the cooling requirements of aircraft engines still in the design stage was described by Marcel Piry, of Ranger Aircraft Engines, Farmingdale, L. I. Mr. Piry said that tests, made in the laboratory with single-cylinder engines, provided accurate data on the cooling requirements of both air and water-cooled engines used in aircraft operated at altitudes from sea level to 31,000 feet.

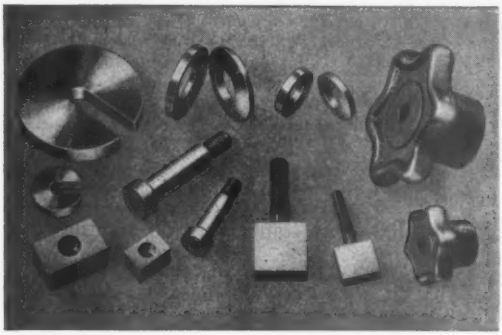
Although superchargers and new aviation fuels have made possible high altitude operations with relatively small increases in engine sizes, Mr. Piry explained, adequate cooling for all powers at all altitudes still is a serious problem.

J. W. Cunningham, of Wright Aeronautical Corp., Paterson, N. J., reported that aircraft powerplant cooling has been facilitated by the application to cylinder barrels of W-shaped cooling fins. The "W" fins, roll-formed from sheet aluminum, were said to be more effective than fins made of other materials and in other shapes, and were said to permit substantial savings in critical materials.

Cutting Tool Manufacturers Announce Surplus Tool Disposal Plan

Mr. H. J. Merrick, Executive Secretary, Cutting Tool Manufacturers' Association, recently announced in a letter to association members the approval by the Department of Justice and the Surplus Property Board of a plan to dispose of surplus cutting tools. The plan, first to be approved generally by both governmental agencies and industry, may serve as a model for other surplus disposals. It is reported that a modification of the plan is ready to be put into effect covering disposal of surplus radio communication equipment. Under the approved cutting tool plan the manufacturer who originally supplied the tools will act as agent for DPC in disposing of surplus tools through normal trade channels.

The plan is designed to speed tool disposal in an orderly fashion, eliminating speculation by requiring the sale



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Quarter-turn Screws - "C" Washers
Shoulder Screws - Locating Keys
Spherical Washers - Hand Knobs

Available from stock

DIE SUPPLY COMPANY

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GUILD Reamers

HALLMARK OF *Precision* IN THE MANUFACTURE OF *Special Reamers*

HIGH SPEED STEEL *in sizes from .030 diam.*

CARBIDE TIPPED *in sizes from .200 diam.*

STRAIGHT • SPIRAL • STEP • PILOT • HAND

● GUILD is the new name for an old established line of reamers whose reputation for accuracy has become outstanding in the manufacture of aircraft—motors—engines—small arms—radios—fine instruments, etc. The name GUILD is stamped on each individual reamer as an identification—a hallmark of finest quality. Quality that is possible only by *creative* and *productive* ability far above the average in the manufacture of *reamers specially built for special purposes.* Write for booklet.

METAL CUTTING TOOLS AND MANUFACTURING CO.

11121 Grand River Ave., Detroit 4, Mich.

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What STERLING *is to silver* GUILD *is to Reamers*

of a minimum of one surplus tool for every three new tools of the same type produced by that manufacturer. There is no restriction, however, on the maximum proportion.

"Coming at this time, announcement of the plan should prove of major benefit." Mr. Merrick stated, "If reconversion should be accelerated, it will make immediately available through normal trade channels surplus tools otherwise frozen. Thus it will make unnecessary widespread duplication of tools on an emergency production basis while similar tools idle in surplus tool warehouses. There seems to be no real reason why the principles involved in this plan cannot be extended to cover a major proportion of all surpluses and particularly items not involving too high a unit cost but produced in large quantities."

Among provisions of the plan are an allowance to manufacturers of appropriate charges for handling, reconditioning and storage. It is understood that the plan also provides for the allowing of normal trade discounts to distributors and other trade channels by the manufacturer in selling the surplus tools.

As a further insurance against increase in surplus tools, orders for new tools by the United States Government or its branches will be filled first from such stocks of surplus tools as are available from the manufacturer-agent.

Dr. Mohling Receives Allegheny Ludlum Award

Dr. Gunther Mohling, of Albany, N. Y., a scientist with the Allegheny Ludlum Steel Corporation, has been presented with a cash award and a certificate of appreciation by the Board of Directors for his contribution in the development of a series of high temperature alloys, one of which is a vital factor in American jet propulsion aircraft production.

W. A. Givens, executive vice president of the company, officiating in the absence of President Hiland G. Batcheller, on leave while serving as Chief of Operations of the War Production Board, said in praising Dr. Mohling for his work:

"The contribution made by Dr. Mohling's development of these high temperature alloys particularly the one for jet aircraft, will rank along side two other notable accomplishments by research men of the company. The former metals were the heat and corrosion resistant valve steel necessary for a practical automobile engine and the even tougher aircraft valve steel which has played such an important part in American aviation." Mr. Givens also stated:

"Allegheny Ludlum always has supplied a major portion of all the valve steels made in the United States both for aircraft and for automobiles. These new alloys for which Dr. Mohling is being honored hold promise of an equally vital contribution in tomorrow's aircraft whether it be for wartime use or in the field of civilian aviation."

Employment or Unemployment

Full employment or unemployment after the war?—is the question posed by a booklet entitled "Production Management — and How It Affects Productivity, Costs and Employment" just issued by the industrial engineering firm of Albert Ramond and Associates, 6300 Chrysler Bldg., New York 17, New York.

Solution of the problems created by the tremendous wartime expansion of our productive capacity and working force, the booklet states, requires establishment of "a relationship between incomes and prices that will assure the necessary purchasing power and confidence. This calls for low prices and high incomes, both of which are closely dependent on high productivity. It demands the most effective use of all our resources—men, plants and materials."

Procedures and policies helpful in the attainment of these aims, based on experience in over a thousand plants, are outlined in the 40-page booklet, which includes 12 pages of pictorial diagrams and charts. Sections are devoted to work measurement, method improvement, labor cost and expense control, production control, job evaluation,

ELOX ELECTRICAL DISINTEGRATION

3 TIMES FASTER

Radically changed—Cuts steel three times faster than before—"Disintegration" used to remove broken tools and cut odd shaped holes for piercing and plastic dies.

3 NEW MODELS

Priced to meet the needs of small shop owners.

ELOX CORPORATION

MACCABEES BLDG. DETROIT 2, MICH.

CHAS. R. BURGESS & ASSOCIATES—NATIONAL DISTRIBUTERS

Be Good to your Lathe

Use Any Standard Knurls ⅝" x ¾"

PRODUCES IDENTICAL DUPLICATE KNURLED PARTS EASILY—QUICKLY

Easy on centers, easy on lathe, easy on operator. Long parts can be easily knurled. Knurls near shoulders. Two sizes: $\frac{1}{16}$" to 2" — 2" to 4". For large or small lathes.

JOSEPH B. FAKES & COMPANY

1415 Etowah Ave. Royal Oak, Michigan

incentive wage plans for production workers, indirect workers and supervisors, and labor's attitude toward increased productive efficiency.

Throughout the presentation, emphasis is put on the need for enlisting workers' cooperation in improvement programs. "In fact," the booklet points out, "success may depend largely on labor's attitude. Labor will benefit greatly from such programs and therefore has every reason to give its full cooperation."

Workers' fear of losing jobs because of increased productivity is the basic reason for their resistance to improved methods and equipment, according to the brochure. To overcome this fear, it states, "a policy whereby management gives workers protection against the immediate unfavorable consequences of technological improvements is definitely desirable. Aside from the human consideration, it is pointed out, such a policy gives management substantial advantages in the way of increased production and lower costs.

Welding Research and Postwar Production

In the opinion of Mr. Charles Eisler, president of Resistance Welder Manufacturers Association, scientific research has more than justified its existence in the field of electric resistance welding by extending the usefulness of this high production process to important new fields.

Mr. Eisler pointed out that at the inception of war production, there were two ways indicated to save weight. One way was to use light metals and high strength, low alloy steels. The second was to use resistance welding for assembly, because this process does not require the use of any additional fastenings and therefore adds no weight to the assembly.

However, metallurgical difficulties were encountered in the welding of many of these materials and it soon became evident that procedures would have to be modified, and process controls improved, in order to obtain the weld quality that was required. The industry joined forces with several interested agencies to sponsor a large group of research projects, directed at the solution of these problems. Stored energy types of resistance welding machines were developed which are capable of delivering the high currents needed for welding the light metals. Weld quality and production rates were both improved by cooperative studies of surface cleaning procedures for aluminum. Use of the oscillograph for measuring welding current and welding pressure provided a valuable method for evaluating the effects of these variables on weld quality, and for establishing satisfactory procedures. Investigations of surface contact resistance provided an excellent control of the effectiveness of surface cleaning solutions. Satisfactory spot welding of hardenable steels was made possible by new techniques, involving the post heat treating of spots in the welding machine immediately after welding.

Mr. Eisler commented that the metal fabricating industries will be able to utilize practically all of the wartime research, which has already paid for itself in increased production.

Postwar Use of Magnesium

At a press conference at the Yale Club in New York, Mr. T. W. Atkins, newly appointed Executive Vice President of The Magnesium Association, declared that "development of this metal's alloys and structural uses portend its peacetime utilization on a scale that will influence national economy and peacetime living standards."

Mr. Atkins asserted that creative inventors, engineers and designers will help arouse public interest in the "lightweight of metals" for consumer goods such as lamps, typewriters, kitchen utensils, vacuum cleaners, furniture, as well as products for the transportation and aviation industries.

"Although during the war, industry, by and large, has recognized that the use of magnesium eliminates unnecessary and surplus weight, public demand will

here is the answer

TO THE PROBLEM OF

DRILLING HARDENED STEEL

GORAL

Carbide Tipped

DRILLS

The advantages of carbide tipped tool bits over high speed steel tool bits in many production line or tool and die shop applications are well known. Now, Goral Carbide Tipped Drills afford these same advantages in drilling holes. For example, they will drill, counterbore or countersink in hardened steel as easily as ordinary drills work in mild steel. Extremely high speeds are possible but when run at ordinary drilling speeds on modern automatic machines Goral Carbide Tipped Drills hold their cutting edges much longer than steel drills and reduce costly down time.

Recommended for:

Drilling Hardened Steel
Drilling Cast Iron, Aluminum, Bronze, Brass, Copper, Plastics
Drilling in Cement with Goral Carbide Tipped Mason Drills.

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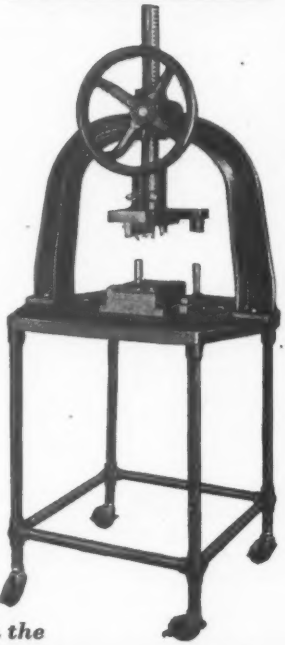
COMPLETE THE DIE-SET AT YOUR BENCH



with the

LACEY DIE-SET MACHINE

Here is a truly "one man" press that operates with one hand and under full manual and visual control.

Handy for tool and press rooms, it permits the diemaker to complete a die-set *right at his bench* . . . saves toolroom and handling costs.

Positive, true punch to-die alignment is assured at all times, thanks to the Lacey's sturdy, open construction. And punches can be removed as often as needed without disturbing alignment once the die-shoe is clamped to the table and punch holder fixed in position in the ram. No pry bar or hammer is needed to separate punches.

The Lacey Die-Set machine is sensitive for delicate work yet rugged enough for fitting up heavy die-sets. Useful, too, for shearing certain types of punches.

Write today for complete details.

Sole Distributors

MOORE SPECIAL TOOL CO., INC.

740 Union Ave. Bridgeport 7, Conn.

stimulate expansion of its uses. Magnesium's machinability and strength as well as its lightness will be more widely recognized. Widespread postwar acceptance and development of magnesium will mean increased plant facilities, new products and more jobs.

"Magnesium is unique among tonnage metals in that its supply is unlimited. One cubic mile of sea water produces 9,000,000 pounds of raw magnesium. This combination of a public demand and an unlimited supply will also stimulate technical research into future applications of the metal. Such research will be of inestimable value to the United States in case our way of life is ever again threatened by an aggressor nation."

According to Mr. Atkins, the Association's present membership of 48 companies engaged in the production, manufacture, fabrication and processing of magnesium represents tremendous growth in the magnesium industry, in contrast to but one or two companies engaged in the production of magnesium in this country in 1925.

"This growth of interest in industry in the metal could be attributed," he said, "to the very striking way magnesium has been adapted to Allied war production. As a light metal with a high tensile strength it is being widely used by aircraft manufacturers, among other things, for wings, propellers, bomb bay doors, structural members, landing gear and wheels, rudder control rods, gas and oil tanks, instrument panels, and radar and electronic equipment."

Directory of New England Manufacturers

Published with editorial cooperation of the New England Council, this comprehensive directory will be available in its 1946 edition on or before August 1st. Besides listing practically every manufacturer large and small in the New England area, with address, it shows products manufactured, size of company, personnel of interest to buyers and sellers. Further information may be obtained by writing the publishers: George D. Hall Co., Dept. S, 30 Kilby St. Boston 9, Mass.

American Mobile Power Plants

First accounts of how American-built mobile electric power trains helped the Red Army smash into Berlin are being discussed by engineers and production experts of the General Electric Company and the American Car & Foundry Company who supplied 63 such plants with a total generating capacity of 143,000 kilowatts to the USSR.

According to a recent Information Bulletin issued by the Embassy of the Union of Soviet Socialist Republics, the mobile power plants have seen real front-line duty.

"They invariably follow in the wake of the advancing Red Army," the bulletin states. "Since the first days of the offensive, mobile stations have traveled to the front with the armored trains and have rendered invaluable service to tank and truck repair shops, supplying them with power."

The Embassy bulletin further revealed "The stations played a vital part in restoring Stalingrad, the Donbas, the Crimea, Zaporozhye, Krivoi, Rog, Gomel, Minsk, and other cities."

The 3000-kilowatt plant is described as a train of nine specially built railroad cars which can be hauled at fast-freight speed and put into service within about eight hours after arrival at a power-needy area. Two locomotive boiler cars, two tenders, a turbine-generator car, a switchgear car, and three cooling tower cars compose each of the plants.

First of the 3000-kilowatt mobile power plants was delivered to the Soviet Government June 1, 1944, at Berwick, Pa., at which point the USSR took the responsibility for shipment abroad. In officially accepting the first unit, Lt. General L. G. Rudenko, chairman of the Soviet Government Purchasing Commission, and a veteran of the defense of Stalingrad, predicted the part that the power trains would play in crushing Germany.

"They will be run close to the lines," he said, "and used to repair tanks,

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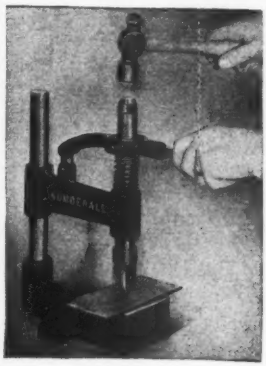

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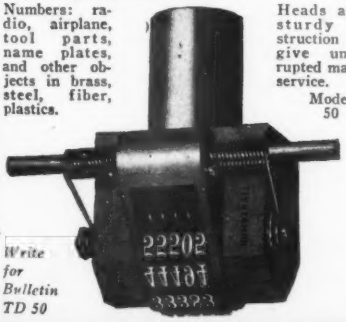

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trucks and other equipment. They will also be used in rehabilitation work as assigned.

"The power trains will aid the war effort greatly," the General declared. "The saving in taking the power plants to the front lines, instead of taking damaged equipment back to repair shops, is apparent."

"The Admiral's Reply"

Captured Jap movies, animated maps and dramatic combat action are combined in the latest Navy motion picture, "The Admiral's Reply", to give a powerful answer to the query: "What can we tell our people about the job ahead in the Pacific?"

"The Admiral's Reply," a fourteen-minute motion picture, made available by the Navy's Industrial Incentive Division for war plant and labor union showings, gives a revealing picture of Jap strength, psychology and battle strategy. It presents a realistic appraisal of the job ahead before Victory in the Pacific can be final and complete.

Narrated by Rear Admiral DeWitt C. Ramsey, Chief of the Navy's Bureau of Aeronautics, the picture highlights facts every war worker should know; the kind of enemy we face in the Jap; the battle ground on which we must fight; the problems peculiar to the Pacific war with its baffling supply problems and staggering distances.

It goes behind the headlines to depict our enemy as rich in natural resources and manpower, fighting a religious war for their emperor, planning a delaying action in the hope we will tire of the war, its casualties and its cost. Sandwiched in with shots lending dramatic emphasis to the job ahead are stark facts on the size of Nippon's army, Jap airpower and the fighting fanaticism of our enemy. It concludes with this message to war workers: "Each of us must stick with our job until the end. Each of us must consider our tools, our work bench, or our desk, as our battle station—not to be deserted until the battle is won."

The film, obtainable in both 16 and 35mm sizes, is available from official Navy incentive film depositories located in or near production centers throughout the country.

Western Steel

Acting through the steel committee of the Western States Council, steel-consuming interests of the 11 western states have demanded immediate action by federal government that would insure private operatio nof steel mills and lower steel prices in the postwar period.

The committee announced the formulation and adoption of the following recommendations:

1. Steel prices in the West must be lowered to a level comparable with prices paid in other industrial centers of the nation.

2. War-built steel mills in the West should be turned over to private operators as soon as possible, in order that properties at Geneva, Utah, and Fontana, California, may be kept in continuous operation following the end of the war.

3. Transfer of the mills to private operation should not be made without statements of price policies to be followed by private operators, and these policies should ban "phantom freight" charges or other factors not related to actual costs.

4. In disposing of the Geneva steel mill, the government should estimate fair value of the plant after deductions for necessary alterations and additions. Adjustment of the Reconstruction Finance Corporation loan made to construct the Fontana plant should bear such a relation to the disposal price of the Geneva mill that neither plant would have an advantage over the other from the standpoint of capital cost to the private owner.

5. Transfer of mills to private owners without abolishing the present steel pricing formula would deprive industries and the consuming public of the West of the benefits they should get from private operation of the mills.

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6. Steel producing companies should at the earliest possible date, establish western steel prices based upon the cost of production at western mills, instead of the present system of basing prices on eastern production costs plus real or arbitrary freight charges.

7. For the Geneva mill to operate in the postwar period, freight rates on finished steel from the mill to western markets must be substantially reduced, and this must be done in advance of the disposition of the mill.

This program of action will be laid before the federal government and western railroads, steel producers and manufacturers. Then cooperative efforts will be sought for government and business groups to play their proper roles in placing the new steel mills in the hands of private operators, under conditions that will insure expansion of the permanent economy of the West.

Airline Passenger and Freight Predictions

A. E. Raymond, vice president of the Douglas Aircraft Company, speaking before a forum on aviation sponsored by the Chicago Association of Commerce and the University of Chicago, predicted a tremendous expansion in airline passenger and freight traffic by 1950.

Mr. Raymond said that by 1950 the minimum annual passenger traffic on airlines should be 4.6 billion passenger miles traveled by 13 million passengers, with a possible maximum of 14 billion passenger miles traveled by 44 million passengers. The smaller traffic figure would require 1,260 of the DC-3 type planes now commonly used by the airlines, but probably would be carried in 90 planes averaging 50-passenger capacity and 360 planes averaging 24-passenger capacity. The maximum traffic figure would require 260 of the 50-passenger planes plus 1,050 of the 24-passenger type. In 1941 the airlines carried 3.72 million passengers a distance of 1.37 billion passenger miles.

The air traffic forecast was arrived at by projecting the prewar growth of air travel, and assuming a reduction in rates from the 5.03 cents a passenger mile in 1941 to 2.5 cents in 1950.

A prospective 1950 minimum volume of 135 DC-3 type ships or 65 of the new 24-passenger type converted to cargo service, as compared with the 1941 figure of 5.2 million ton miles, was forecast by the speaker on the basis of the newest cargo rates averaging about 35 cents a ton mile against 59 cents in 1941.

Revenue from airline passenger business was $68,500,000 in 1941, while air cargo revenue amounted to about $3,000,000. Taking the minimum future estimate for 1950 traffic, passenger revenue would be $215,000,000 and cargo revenue $47,000,000, Raymond said.

At the same forum Mr. William Littlewood, vice president, engineering, American Airlines, Inc., predicted that transport airplanes will be operating on schedule at speeds up to 400 miles an hour within the next five years.

The new types of airplanes which may become available in one to three years from now will be of quite conventional arrangement, but will be greatly refined from the prewar transports, as well as somewhat larger and greatly superior in performance, comfort and economy, Littlewood predicted. Thereafter it is quite reasonable to assume that, with the tremendous amount of energy being devoted to the power plant revolution, there may well be a growing preponderance of aircraft of quite different type so that in 10 to 15 years a present day airplane may appear old-fashioned, he declared. Airplanes of varying size and performance characteristics will be needed in the postwar period, each designed to fill a narrow range of operating requirements.

Littlewood questioned the forecasts of lower operating costs for airlines in the next five years. The operators have applied their best abilities to the study of these costs, and "I know of nothing in such studies to justify conclusions of rates of 2½ cents per passenger mile or 5 cents per cargo ton mile, or any reasonable facsimile thereof, during the period in question", he asserted. "It will be a growth period inviting correspondingly high costs of operation," he concluded.

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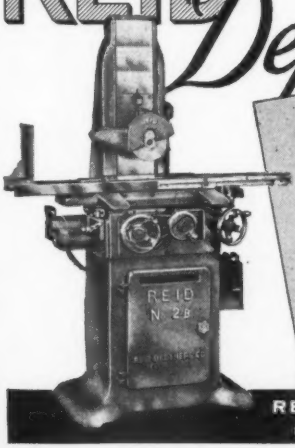

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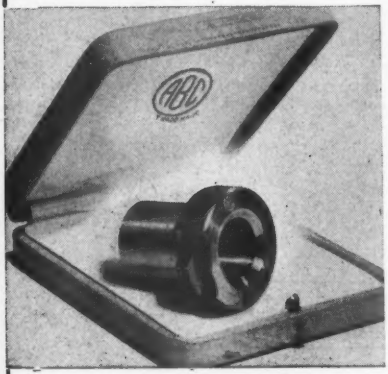

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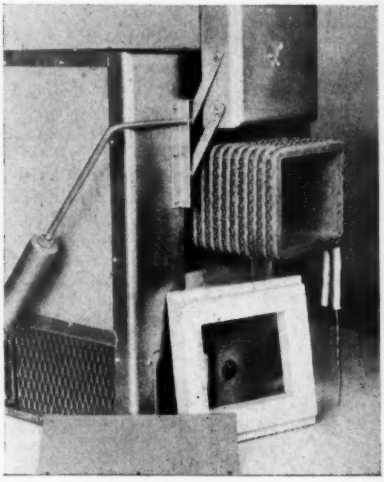

is connected. After loosening these terminals the muffle core, which is grooved on the outside to accommodate the coiled element, can be removed from the front. Thermocouples are simply replaced after removing the protecting cover on the back of the furnace. Another feature of model OFE is the TEMPCOTROL which controls temperature by use of an input controller and indicating pyrometer. The controller can be manually set to turn the current on and off for any desired portion of each one minute cycle. Any temperature from 500 degrees to 1900 degrees F is maintainable by proper control setting, which, with the pyrometer, an indicating light and switch, is mounted on an instrument panel in the base of the furnace.

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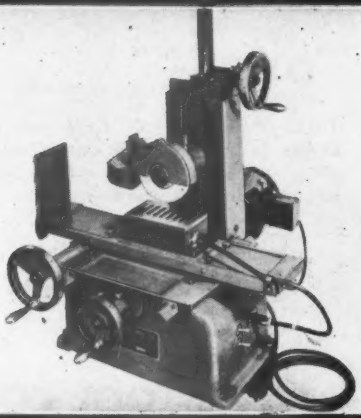

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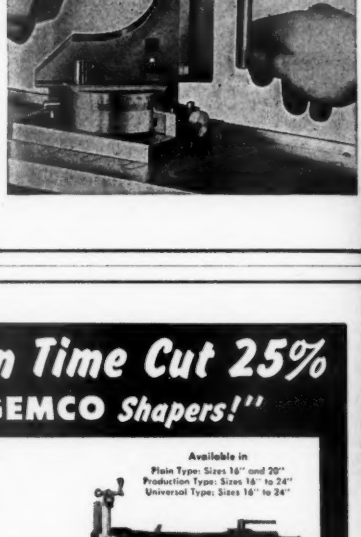

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INDUSTRIAL ORGANIZATION & MANAGEMENT, by Lawrence L. Bethel, Director, New Haven YMCA Junior College, Director, ESMWT Program of Yale University and New Haven YMCA Junior College; Franklin S. Atwater, Production Engineer, The Fafnir Bearing Company, Lecturer, Department of Business and Engineering Administration, Massachusetts Institute of Technology; George H. Smith, Lawyer and Economist; and Harvey A. Stackman, Jr., Personnel Administrator, Scovill Manufacturing Company, Member, Instructional Staff of the ESMWT Program, Yale University and New Haven YMCA Junior College. The art of managing an industrial enterprise today is highly complex. Management as a field of specialization within itself, rather than as an adjunct to the study of engineering or business, is the subject of this book designed to give the reader a sound basis for advanced work in methods, cost, industrial relations, budgeting, production control, marketing, office management. Four principal sections cover: I, American Industry, its history and economic and social foundations. II, Organizing the Industrial Enterprise, the principles of forecasting, financing, internal organization, product development, physical facilities. III, Operating the Enterprise, manufacturing the product, planning of the control functions, selling the product, managing the general offices, administering personnel. IV, Coordinating the Enterprise, dynamics of an industrial organization. Published by the McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 18, N. Y. 798 pages, well indexed. Priced at $4.50

TOOL STEEL DATA SHEET. A new data sheet on its Ketos Oil Hardening Tool Steel has recently been issued by Crucible Steel Company of America, Dept. J, 405 Lexington Ave., New York 17, N. Y. The sheet lists typical applications, and includes complete time and temperature data for forging, normalizing, annealing, hardening and tempering. Size change and toughness charts and the TTT curve are also included.
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INDUSTRIAL RADIOGRAPHY WITH RADIUM (Third Edition) is an 80-page manual prepared by the technical staff of the publishers, Canadian Radium and Uranium Corp., Dept. D, Rockefeller Center, 630 Fifth Ave., New York, N. Y. It is a concise textbook on the practical use of industrial radiography with radium and is used as a basis for instruction in gamma-ray inspection methods. Radiography with radium is now a thoroughly

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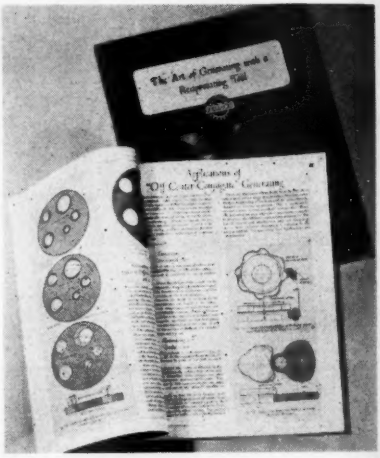

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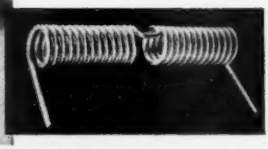

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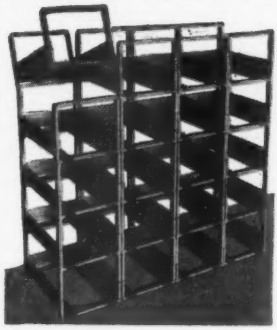

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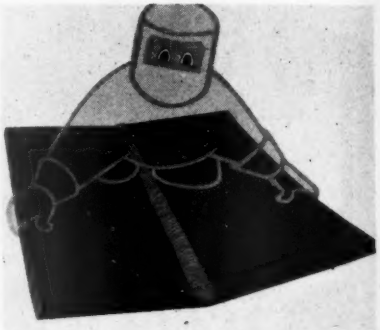
In the forefront of the book the author has analyzed the principle of generation, and pointed out the applications of this principle with illustrations so simple and illuminating as to open up a concept which will be new even to old-timers in the mechanical world.

There are one hundred thirty-eight illustrations, the majority of them diagrams and examples of practical applications. Among these are a great variety of external and internal surfaces that can be machined to extremely close tolerances.

Later pages analyze the machine features and modifications in individual units which make possible, on a standard machine tool, the many operations that ordinarily would require the use of specially designed, single purpose machines.

This book is available for general distribution, with the compliments of the Fellows Gear Shaper Company.
INFORM-A-GRAM KEY No. 290-Z

INTRODUCING MR. SHRINK. Symbolizing the cause of distortion in arc welding, Mr. Shrink is the villain of the piece in a new 16 mm sound, color motion picture made by Walt Disney Productions for The Lincoln Electric Company, 12818 Coit Rd., Cleveland 1, Ohio. The title of this unusual presentation



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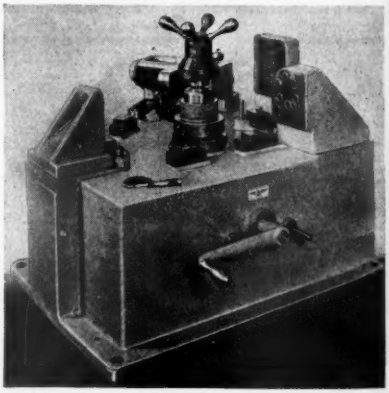

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using an optical flat, a toolmakers flat and a gage block

The formula is:

$$D = h + \left(.000012 \times N \times \frac{W}{w}\right)$$

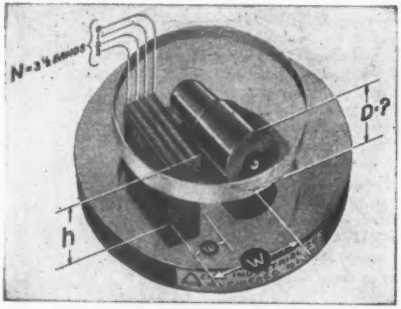
Substitute the actual values

$$D = .750 + \left(.000012 \times 3\tfrac{1}{2} \times \frac{1\ 7/16''}{23/64''}\right)$$

and get the answer

D = .750168 inch.

It's just that simple!



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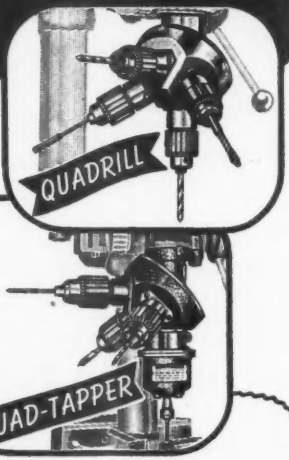

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SHOP AIDS

is, "Prevention and Control of Distortion in Arc Welding." In the picture, Mr. Shrink sets out to cause all kinds of trouble but is skillfully headed off at every turn and, without his knowing it, his efforts at evil are actually turned to good in overcoming distortion in certain situations. The story has been cleverly built to show interestingly and understandably just why metals expand and contract when they are heated and cooled, and how the most vicious efforts of Mr. Shrink may be anticipated, and either prevented or controlled. The film has a running time of 20 minutes and is available from The Lincoln Electric Company at no cost other than transportation.

STARRETT STUDENT MACHINISTS' BOOK takes the place of the two volumes previously published: Vol. 1, The Starrett Book for Machinists' Apprentices, and Vol. 2, The Starrett Data Book for Machinists. By incorporating the reference data for the expert machinist, formerly confined in Vol. 2, the usefulness of the present volume will not only be broadened but will be maintained long after the student has become a full fledged expert. Machinists are a group who are making a major contribution to human progress and achievement and may well enjoy a constant and enduring pride and satisfaction in their work. This book is to assist the student machinist in familiarizing himself with the fundamentals of all good mechanical work and to provide him with reference material of the broadest usefulness to both beginner and expert. Published by L. S. Starrett Co., Dept. T, Athol, Mass., and priced at 75 cents per copy.

EXPERIMENTAL SPECTROSCOPY is a recent publication by Ralph A. Sawyer, Ph. D., Professor of Physics at the University of Michigan. The book successfully avoids extensive mathematical treatments, and is designed both for students of spectroscopy and for workers in research laboratories who are making increasing use of spectroscopic procedures for inspection and analysis. General physics and some physical optics are sufficient background for an understanding of the author's presentation. Emphasis is properly placed on those principles and techniques fundamental to practically all applications of spectroscopic equipment; hence the general principles of spectroscopic apparatus, the theory and use of prisms and gratings, photographic procedures and intensity determinations are disclosed in detail. EXPERIMENTAL SPECTROSCOPY is published by Prentice-Hall, Inc., Dept. TJ, 70 Fifth Ave., New York, N. Y., and is priced at $5.00 per copy.

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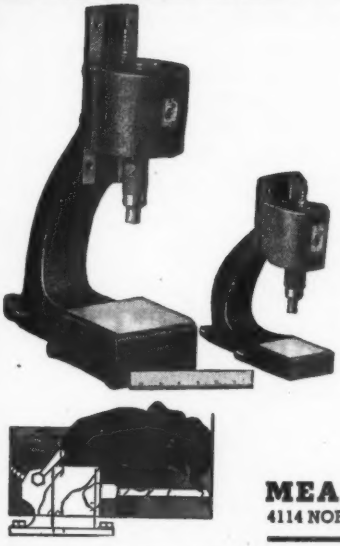

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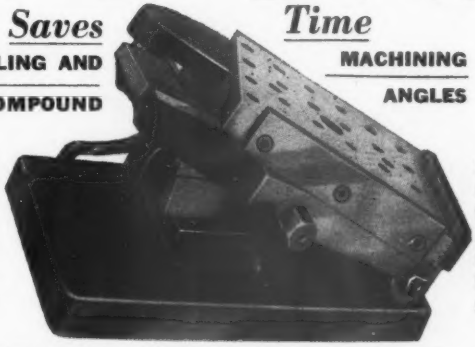

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INFORM-A-GRAM KEY No. B37-Z

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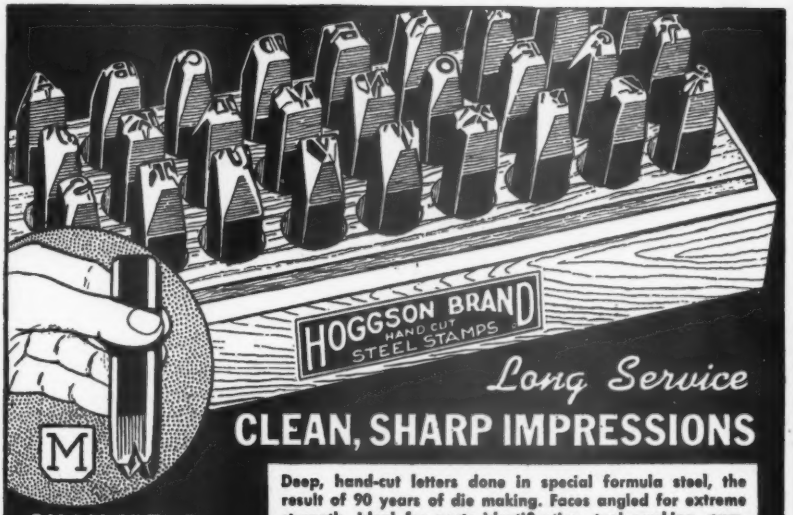

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	11/64"	2.15
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	13/64"	2.34
	7/32"	2.45
	15/64"	2.54
	1/4"	2.63
	17/64"	2.73
	9/32"	2.82
	19/64"	2.93
	5/16"	3.02
	21/64"	3.18
	11/32"	3.36
	23/64"	3.56
	3/8"	3.75
	25/64"	3.95
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	27/64"	4.29
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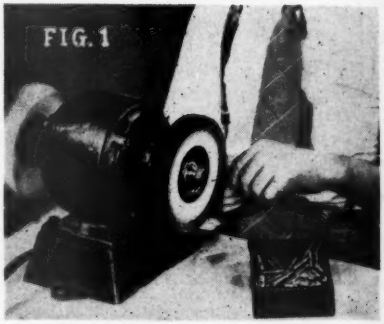

burrs from airplane motor studs was done by end-to-end, hand rotating each stud while holding it against a brush as shown in Fig. 1. In Fig. 2 is shown the improved method. Two metal tubes were placed parallel to the bench top and in each tube a cut-out section permits the rotating brush to burr studs as fed through the tubes. Another improvement was positioning wheel and tubes below the table top so studs could be fed through table top slots.

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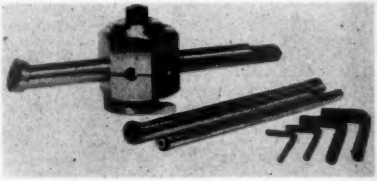
Boring Tool and Holder

A true knifelike cutting action is achieved by the Shearcutter, made by the Shearcut Tool Co., Dept. TJ, Tenth and Harris Sts., South Bellingham, Wash. From 20 to 50 new cutting edges are provided for this circular boring and turning tool, depending on the degree of rotation to successive new positions until it needs over-all resharpening. Shearcutter increases tool life and should pay for its cost by the saving in grinding time before its initial regrinding. Shearcutter's symmetrical, circular form simplifies and reduces time required for regrinding. Boring and turning speeds of Shearcutters compare favorably with the performance of tungsten carbides. For instance, 260 ft. of 1⅜" dia., 4340



chrome vanadium steel, heat treated to a psi of 140,000 lbs, was turned to size at 320 rpm with a feed of .055"; chips cold and uncolored by extreme heat, while tool life was 24 to 32 hrs between regrinds. An inexperienced operator finish turned over 400 ft of 2½" dia. sand cast, navy bronze bushing stock, removing .230" of sand filled stock at a speed of 510 rpm with a feed of .030". Tool life was over 24 hours cutting time between necessary regrinds, each of which was accomplished in 50 to 70 seconds. The precision tool holder is made in five sizes to accommodate lathes and screw machines having from 10" swing to 36" swing. Each tool holder is furnished with three boring bars, one arranged for turning in the smaller sizes and two arranged for turning as well as boring in the larger sizes. Bored and reamed bar holes and ultra-precision machining help to make it a completely rigid tool holder.

INFORM-A-GRAM KEY No. 872-Z

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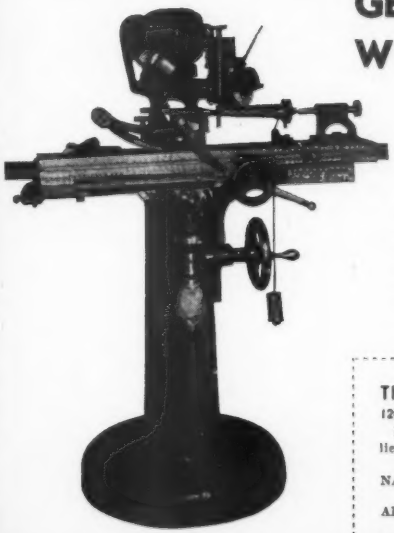

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Evans Dual-Spiral Reamer

The Evans Dual-Spiral Reamer, produced by Evans Reamer and Machine Co., Dept. TJ, 529 South Main St., New Lexington, Ohio, is particularly well suited to reaming holes involving slots, oil grooves, keyways, split bushings or any interrupted cuts. It reams to such a fine finish that honing can usually be eliminated. Consequently on some production operations savings have been effected on plug gage wear because honing abrasive deposits were not encountered. Such economies in operation and equipment are a notable feature of the Evans Dual-Spiral Reamer's performance. The Dual-Spiral Reamer is constructed with two left-hand flute and one right-hand flute blade segments. The three blade segments spiral simultaneously, thus achieving an opposed shearing action which reams holes to close tolerances and mirror smooth in practically any type of metal or plastic. The Evans reamer has an unusually large expansion range of from .035" in the smallest size up to .080" in the largest size standard models. Within several seconds, all of the blade segments can be removed for resharpening by use of the Evans plant service. A spare set of blade segments constantly provides the reamer with sharp blades which can be resharpened 8 to 10 times each. In addition to the five standard hand and machine models, special reamers are designed and made to meet specific engineering problems. Manufacturers who have such problems are invited to send their blueprints directly to the Evans plant. Extension and follow-pilots are available for line reaming jobs. Evans Dual-Spiral Reamers come in sizes of from ½" to 3$\frac{3}{32}$" diameters.

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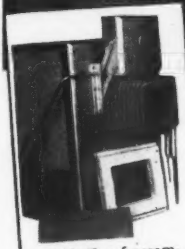
NEW **TEMCO** ELECTRIC MUFFLE FURNACE

Model OFE . . . for Shop and Laboratory



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Size—Overall 22" x 34" x 18"
Muffle chamber 6" x 5" x 10"
Operating temperature
Continuous 1600° F.
Intermittent 1900° F.
Current consumption
2000 Watts maximum
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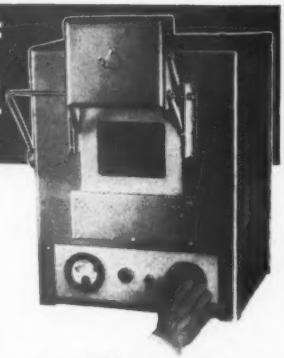
Price—115V. or 230V. $194.00



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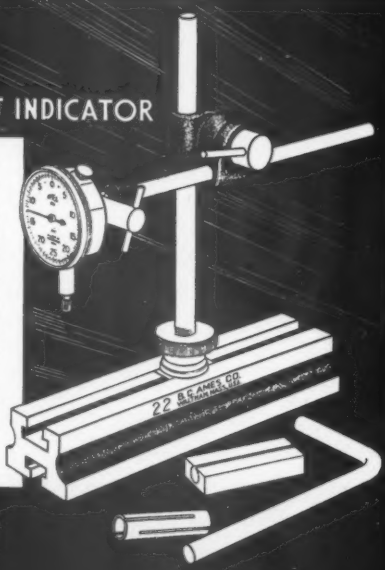

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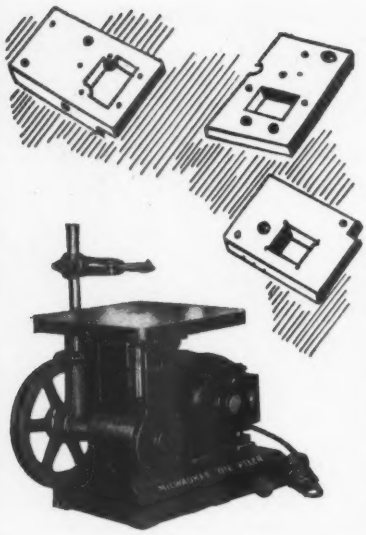

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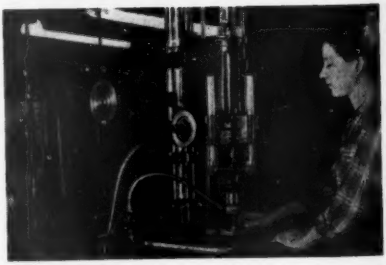
"Lead-Screw" Tapping Machines

Detroit Light Duty LTM-16, Lead-Screw Tapping Machines, made by the Detroit Tap and Tool Co., Dept. TD, 8432 Butler St., Detroit 11, Michigan, with their floating tap holders and simple, non-clamping fixtures have enabled the Flint Manufacturer's Service Co. to in-



crease by 180% their production of retraction levers for 50-caliber machine guns, decrease rejects, and lengthen tap life by 25% while using unskilled women operators. The particular job involved was the tapping of a $\frac{7}{16}$-20 NS thread $\frac{3}{8}$" deep to a class 3 fit in the retraction lever, a tough SAE 1050 forging. Each piece had one tapped and one reamed hole. With the Detroit Light Duty LTM-16 running at tapping speed of

(TO PAGE 198—PLEASE)

THREAD PLUGS
THREAD RINGS
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Hammond's popular, precision-built, wet grinder (shown) has a 10" cup wheel on each end. It features the patented No Spray - No Splash Coolant System, and Safety Cup Discs which prevent tool being dropped into cup of wheel. Write for complete data.

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Grinding Wheel Form-Checker

A convenient and inexpensive method of checking the dressed profile of a grinding wheel is embodied in the Form-Checkers made by the J & S Tool Company, Dept. TJ, E. Orange, N. J. Form Checkers are convenient sized rectangular templates of uniform thickness made from a tough, non-burring, plastics material that takes a clear sharp outline without either wearing down or changing the wheel form. The use of these checkers reduces form grinding spoilage by permitting a fast and simple means of form checking before the trial cut and at frequent intervals during grinding. Form grinding spoilage is often caused by the trial cut in the work being made before the form has been checked for accuracy. The usual method of checking is to use paper, cardboard, tin or even costly flat stock which when fed into the wheel becomes a replica of the form profile suitable for accurate checking on a profile projector. Some of these materials burr and "fuzz-up" and consequently do not give a sharply defined projected shadow of the true profile; they also tend to break down the wheel form thereby necessitating redressing of the wheel. Additionally, suitable stock is often difficult to quickly locate and may be irregular and unwieldy in shape. These disadvantages are all most satisfactorily overcome by the nature of the plastics material and the convenience of these J & S Form-Checkers.

INFORM-A-GRAM KEY No. 339-Z

★

(CONTINUED FROM PAGE 196)

400 rpm, a production capacity of 450 pieces per machine per hour was consistently obtained, thus tripling the previous production capacity. This equals a floor-to-floor average of 8 seconds per piece. Such speed was obtained partly because all need for holding the workpiece during the return stroke was eliminated by high precision control of the tap. Instead of clamping each piece, the use of locating pins on the simple platen fixture, with its .010" float, simplified work positioning and materially speeded loading and unloading. Centering difficulties were practically eliminated by action of the floating tap holder. Use of the light duty LTM-16 tapping machines eliminated rejects due to lead errors, for with the power take-off between the lead-screw and spindle, the lead-screw functions only as a lead guide without being subjected to the tap driving torque.

INFORM-A-GRAM KEY No. 134-Z

ANGLES
TO A MINUTE...
IN A MINUTE!
THE BEMISINE
SPEEDS UP AND SIMPLIFIES SETTING ANY ANGLE FROM 0 TO 90°
—USING ONLY A 2" MICROMETER!* IT HOLDS THE WORK! FASTER THAN A SINE BAR OR PROTRACTOR! CONVERTS SET-UP TIME TO PRODUCTION TIME ON SURFACE GRINDERS, JIG BORERS AND MILLERS.
*Also Used With Standard Gage Blocks
NICHOLS-MORRIS CORPORATION

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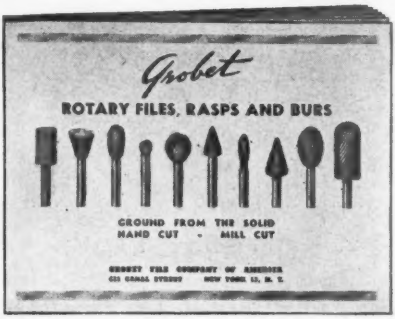

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Uniform full work-length friction locking—complete control and contact of your entire bore surface area. Repeated placement of parts in successively exact position duplication. Self-contained, self-expanding, self-locking—instant unloading—interchangeable sleeves. Built to your bore tolerance limits. For taper, straight shank, face plate or between centers mountings. Any machine operation. For bore diameters .718 to 5.0. Quotations made from your detailed sketches of desired mandrels showing part in position.

PLANT WHERE PHOTO WAS TAKEN STAMPED OVER 2,000,000 PARTS PRIOR TO PEARL HARBOR. DIES STILL GOOD.

WHEN YOU SWING BACK TO CIVILIAN PRODUCTION

Start your tooling program right—specify Strenes metal for all your drawing and forming dies.

It can be cast to shape (usually to 1/10"). It will reduce machining time ⅓ to ½. It will stamp far more parts between redressings than conventional dies. It is *guaranteed uniform in metallurgical structure and physical properties because only the home plant casts Strenes metal.* No licenses.

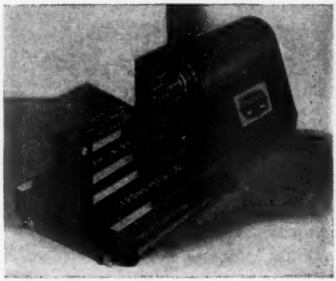
Ask almost any manufacturer of cars, trucks, tractors, refrigerators, stoves for their confidential opinion of Strenes dies. We'll gladly furnish names of men to contact.

Better still order one trial casting. No charge if claims not borne out. That puts it up to us.

THE ADVANCE FOUNDRY CO.
DAYTON 3, OHIO

STRENES METAL
DRAWING AND FORMING DIE METAL

Strong Multi-Purpose Grinder Attachment



The device illustrated was originally improvised by its present manufacturer to take care of a war emergency in his own plant when it became necessary to adapt a surface grinder to do a job that normally would have been handled on a large cylindrical grinder tied up at the time on other important work. Three years' use in actual production and tool room operations not only resulted in development of the attachment into a precision tool but also demonstrated that it had many diversified possibilities as an aid for the surface grinder, miller, shaper, drill press, boring machine and engine lathe.

The attachment has a capacity of 6" between centers and will accommodate a workpiece up to a diameter of 6". A special tension spring in the tail stock compensates for possible expansion of the workpiece but the center may be

(TO PAGE 203—PLEASE)

BUY WITH CONFIDENCE

A directory of products, listing for ready reference the names of their manufacturers and dealers. Complete information about any product may be had upon request made to the firm listed or to us.

ABRASIVE PAPER & CLOTH
Behr-Manning Corp., Div. Norton Co., Dept. TD, Troy, N. Y.
Carborundum Co., The, Dept. TD, Niagara Falls, N. Y.
Norton Co., Dept. TD, Worcester 6, Mass.
Walls Sales Corp., 97 Warren St., New York, N. Y.

AIRCRAFT PARTS—Precision
Noble & Stanton, Inc., 998 Broadway, Bedford, O.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Sav-Way Industries, Box 117 Harper Sta., Detroit 13, Mich.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.

AIRCRAFT SERVICING & PRODUCTION EQUIPMENT
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.

ALLOYS
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.
Gage Co. Division, Dept. TD, Battle Creek, Mich.

ASSEMBLING MACHINES—Automatic
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

AUTOMATICS—Rotary for Burring, Brushing, Buffing, etc.
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 52, Mich.

BALLS—Carbide
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.

BARS—Boring (See Boring Bars)

BARS—Steel
Latrobe Electric Steel Co., Dept. TD, Latrobe, Pa.

BELTS—Endless
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Preis Engraving Machine Co., H. P., 189 Summit St., Newark 4, N. J.

BENCH BLOCKS—Duplex
Challenge Machinery Co., The, Dept. TD, Grand Haven, Mich.

BENCH MACHINERY—Precision
Ames Co., B. C., Dept. TD, Waltham, Mass.

BENCH PLATES (See PLATES—Bench)

BENCHES—Work
Challenge Machinery Co., The, Dept. TD, Grand Haven, Mich.

BENDERS
Lewthwaite Machine Co., T. H., 314 E. 47th St., New York 17, N. Y.
O'Neil-Irwin Mfg. Co., 315 8th Ave., So., Minneapolis 15, Minn.

BINS—Assembly & Storage
Stackbin Corp., 97 Troy St., Providence 1, R. I.

BITS—Tool (See TOOL BITS)

BLADES—Band Saw (See BLADES—Hack & Band Saw)

BLADES—Cutting Off
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Carborundum Co., The, Dept. TD, Niagara Falls, N. Y.

BLADES—Hack & Band Saw
Armstrong-Blum Mfg. Co., 5700 W. Bloomingdale Ave., Chicago 39, Ill.

BLANKS—Milling Cutter
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

BLOCKS—V (See V-BLOCKS)

BLOWERS
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.
Niagara Blower Co., Dept. TD-55, 6 E. 45th St., New York 17, N. Y.
Strong, Carlisle & Hammond Co., 1394 W. Third St., Cleveland 13, O.

BOLTS—Eye & T Slot
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Boyar-Schultz Corp., 2112 Walnut Cleveland 3, O.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

BOLTS—Socket Head Stripper
Holo-Krome Screw Corp., The, Dept. TD, Hartford 10, Conn.

BOLTS—Stripper
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Holo-Krome Screw Corp., The, Dept. TD, Hartford 10, Conn.

BORING—Attachments
Rusnok Tool Works, 4840 North Ave., Chicago 39, Ill.

BORING BARS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit 12, Mich.
Gairing Tool Co., The, Dept. TJ, Detroit 32, Mich.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

BORING HEADS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Criterion Machine Wks., Dept. TD, Beverly Hills, Calif.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Super Sales & Engineering Co., 2245 N. 48th St., Milwaukee 8, Wis.

BORING MILL—Horizontal
DeVlieg Machine Co., 450 Fair Ave., Ferndale 20, (Detroit) Mich.
Portage Machine Co., The, 555 Miami St., Akron 11, O.

BORING TOOL HOLDERS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.

BORING TOOL PARTS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.

BORING TOOLS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill.
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Gairing Tool Co., The, Dept. TJ, Detroit 32, Mich.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.
Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich.

BOX TOOLS
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Mich.

BRAKES
Cincinnati Shaper Co., Hopple, Garrard & Elam Sts., Cincinnati, O.
O'Neil-Irwin Mfg. Co., 315 8th Ave., Minneapolis 15, Minn.

BROACH—Holders
American Broach & Machine Co., Dept. TD, Ann Arbor, Mich.
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.
U. S. Broach Co., 6466 E. 7 Mile Rd., Detroit 12, Mich.

BROACH—Pullers
American Broach & Machine Co., Dept. TD, Ann Arbor, Mich.
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

BROACHES
American Broach & Machine Co., Dept. TD, Ann Arbor, Mich.
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.
U. S. Broach Co., 6466 E. 7 Mile Rd., Detroit 12, Mich.

BROACHING FIXTURES
American Broach & Machine Co., Dept. TD, Ann Arbor, Mich.
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.
U. S. Broach Co., 6466 E. 7 Mile Rd., Detroit 12, Mich.

BROACHING MACHINES
American Broach & Machine Co., Dept. TD, Ann Arbor, Mich.
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.
Cincinnati Milling Machine Co., The, Dept. TD, Cincinnati 9, O.
Colonial Broach Co., P. O. Box 37, Harper Sta., Detroit 13, Mich.

BURNERS—Gas & Oil Furnace
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.
Strong, Carlisle & Hammond Co., 1394 W. 3rd St., Cleveland 13, O.

BURNISHING TOOLS
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Ill.

BURRING MACHINES
Mead Specialties Co., Dept. H-445, 4114 No. Knox Ave., Chicago 41, Ill.

BURRING TOOLS
Nobur Mfg. Co., 912 No. Orange Drive, Los Angeles 38, Calif.

BURRS—Rotary
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

BUSHINGS—Collet
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

BUSHINGS—Die
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.

BUSHINGS—Drill
Accurate Bushing Co., 447 North Ave., Garwood, N. J.
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Colonial Bushings, Inc., 145 Jos. Campau St., Detroit, Mich.
Universal Engineering Co., Dept. TD, Frankenmuth, Mich.

CALIPERS
Lufkin Rule Co., Dept. TD, Saginaw, Mich.

CAMS
Gage Co. Division, Dept. TD, Battle Creek, Mich.
Hartford Special Machinery Co., The, 281 Homestead Ave., Hartford, Conn.
Newton Mfg. Co., 314 W. 7th St., Los Angeles, Calif.
Siewek Tool Div. of Domestic Industries, Inc., 231 S. LaSalle St., Chicago 4, Ill.

CARBIDE
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.

CARBIDE TOOLS AND BLANKS
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.

CARBIDE TOOLS—Sintered
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.

CARBURIZERS—Liquid & Solid
Park Chemical Co., 8074 Military Ave., Detroit, Mich.

CASTINGS—Air & Oil Hardening, Cast-to-Shape
Allegheny Ludlum Steel Corp., Forging & Casting Div., Dept. TD, Detroit 20, Mich.

CASTINGS—Nitri-cast-iron
Allegheny Ludlum Steel Corp., Forging & Casting Div., Dept. TD, Detroit 20, Mich.

CENTERS
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

CENTERS—Live
Acme Tool Co., 196 Church St., New York 13, N. Y.
Sturdimatic Tool Co., 5218 Third Ave., Detroit 2, Mich.

CERROBASE (Also see Alloys)
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.

CERROBEND (Also see Alloys)
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.

CERROSAFE (Also see Alloys)
Cerro de Pasco Copper Corp., 40 Wall St., New York 5, N. Y.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.

CHAMFERING MACHINES
Builders Iron Foundry, 23 Codding St., Providence 23, R. I.

CHAMFERING TOOLS
Nobur Mfg. Co., 912 No. Orange Drive, Los Angeles 38, Calif.

CHARTS—Piano, Spherical, Compound
Needham, E. H., Dept. 2n, Culver City, Calif.

CHASERS—Thread
U. S. Machine Tool Mfg. Corp., 100 So. 6th St., Clinton, Ind.

CHECKING DEVICES
Electrix Corp., 156 Middle St., Pawtucket, R. I.

CHESTS—Tool
Scherr Co., Inc., George 200-B Lafayette St., New York 12, N. Y.

CHROMIUM PLATING
Hartford Chrome Corp., 525 Park St., Hartford 6, Conn.

CHUCKS—Collet
Allison Tool & Engineering Co., 4031 Whittier Blvd., Los Angeles 23, Calif.
Erickson Tools, Dept. C, 2309 Hamilton Ave., Cleveland 14, O.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.
Universal Engineering Co., Dept. TD, Frankenmuth, Mich.

CHUCKS—Drill
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Jacobs Mfg. Co., The, Dept. TD, Hartford, Conn.
Lee Co., K. O., Dept. TD, Aberdeen, S. D.

CHUCKS—Lathe
Acme Tool Co., 196 Church St., New York 13, N. Y.

CHUCKS—Magnetic
Acme Tool Co., 196 Church St., New York 13, N. Y.
Rockford Magnetic Products Co., 1306 18th Ave., Rockford, Ill.

CHUCKS—Wrenchless
Thomas Hoist Co., 20 So. Hoyne Ave., Chicago 12, Ill.

CLAMPS
Armstrong Bros. Tool Co., 340 N. Francisco Ave., Chicago 12, Ill
Cincinnati Tool Co., The, 1964 Wareerly Ave., Cincinnati 12, O.
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Gibson Co., The, William D, 1800 Clybourn Ave., Chicago 14, Ill. (Div. of Associated Spring Corp.)
Howell Manufg. Co., 1373 E. 95th St., Cleveland 6, O.
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.
Mead Specialties Co., Dept. HA-445, 4114 No. Knox Ave., Chicago 41, Ill.
Siewek Tool Div. of Domestic Industries, Inc., 231 S. LaSalle Street, Chicago 4, Ill.

CLAMPS—Die
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.

CLAMPS—Toggle
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Detroit Stamping Co., 344 Midland Ave., Detroit 3, Mich.
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.

CLAMPS—Toolmakers Parallel
Lufkin Rule Co., Dept. TD, Saginaw, Mich.

CLEANERS—Metal
Park Chemical Co., 8074 Military Ave., Detroit, Mich.

CLINOMETERS
Acme Tool Co., 196 Church St., New York 13, N. Y.

CLIPS
Gibson Co., The, William D., 1800 Clybourn Ave., Chicago 14, Ill. (Div. of Associated Spring Corp.)

COLLET INDEX FIXTURES
Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.
Zagar Tool, Inc., 23800 Lakeland Blvd., Cleveland 17, O.

COLLETS
Allison Tool & Engineering Co., 4031 Whittier Blvd., Los Angeles 23, Calif.
Bellows Co., The, 867 E. Tallmadge Ave., Akron 10, O.
Erickson Tools Co., Dept. C, 2309 Hamilton Ave., Cleveland 14, O.
General Die & Stamping Co. (Precision Collet Div.), 262-272 Mott St., New York 12, N. Y.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Hardinge Brothers, Inc., Dept. TD, Elmira, N. Y.
Rivett Lathe & Grinder, Inc., Dept. TD, Brighton, Boston, Mass.

COMPARATOR CHARTS
Gage Co. Division, Dept. TD, Battle Creek, Mich.
Universal Engraving & Colorplate Co., Inc., 1919 E. 19th St., Cleveland 15, O.

COMPARATORS
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
Trico Products Corp., 40 Trico Sq., Buffalo 3, N. Y.

COMPARATORS—Optical
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.

CONTOUR METAL WORKING MACHINES
Continental Machines, Inc., 1302 S. Washington Ave., Minneapolis 4, Minn.

CONTROLS—Air
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

COOLANT SYSTEMS
Gray-Mills Co., 1951 Ridge Ave., Evanston, Ill.

COOLERS—Air
Niagara Blower Co., Dept. TD-55, 6 E. 45th St., New York 17, N. Y.

COOLING SYSTEMS—Spot Welder
Gray-Mills Co., 1951 Ridge Ave., Evanston, Ill.

CORE BITS
Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich.

COUNTERBORES
Acme Tool Co., 196 Church St., New York 13, N. Y.
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Genesee Mfg. Co., Inc., Dept. TD, Rochester 4, N. Y.
Mohawk Tool Co., 21647 Dequindre Rd., Hazel Park, Mich.
National Twist Drill & Tool Co., Dept. TD, Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix Ave, Detroit 7, Mich.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

COUNTERBORES—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

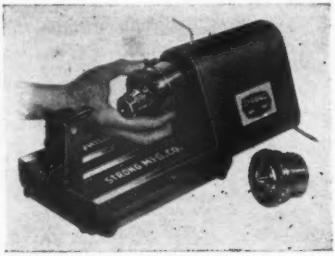
COUNTERSINKS
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.

(CONTINUED FROM PAGE 200)

locked if desired. Long rods or tubes may be handled by removing the tail stock center and extending the piece through the motor housing. A precision indexing fixture is provided for grinding flats, squares, hexagons, etc., and for making up broaches, grinding relief in taps and the like.

The special motor rotates the workpiece, which may be tilted forward or backward to any desired angle. Right or left-hand pitches may be cut without removing the piece. Vernier adjustment facilitates final angular settings.

The standard index face plate may readily be removed and a collet holding face plate substituted as shown in the illustration below. This makes possible the grinding of all kinds of rods or tubes into such special shapes and forms



as pilots for counterbores, step drills for various ID's, angular cuts on counterbores or drills. Strong Mfg. Co., Dept. TJ, 5312 Westminster Avenue, Philadelphia 31, Pa.

INFORM-A-GRAM KEY No. C15-Z

★

New Location for Colonial Bushings

Colonial Bushings, Inc., producers of Colonial drill jig bushings has completed moving into new quarters at 21601 Hoover Rd., Detroit, Mich., from the former location at the foot of Jos. Campau Street. The company, at its new location will carry an expanded line of standard jig bushings in stock for immediate shipment. In its new location, Colonial Bushings will be produced under controlled conditions in a modern plant. Design of the plant is such as to maintain as near constant temperature conditions summer and winter as possible to insure maximum precision in the finishing of their drill jig bushings.

Johnson
Furnaces
for QUICK Action

SPEED UP Heat-Treating with Efficient JOHNSON 130A Hi-Speed Furnaces

FIREBOX
7¾" high
13" wide
16½" long

For quick, accurate heat-treating of high-speed steels, dies and tools. Reaches operating temperatures FAST to save time and gas. Gets the job done before conventional type furnaces heat up. Counter-balanced door opens upwards. Heavily lined with high temperature insulating refractory. 4-Burner unit shown for 1400 to 2000° F. 6-Burner unit for temperatures 1800 to 2400° F. Complete with Carbofrax hearth, G.E. motor and Johnson Blower.

ORDER TODAY

4-Burner $295
• 6-Burner $325
F. O. B. Factory

FREE . . . Use coupon for Johnson Catalog

JOHNSON GAS APPLIANCE CO.
575 E Ave., N. W., Cedar Rapids, Iowa

Name .....
Address .....
City .....
State .....

Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Severance Tool Industries, Inc., Dept. TD, Saginaw, Mich.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CRANES
Cullen-Friestedt Co., 1316 So. Kilbourn Ave., Chicago 23, Ill.

CUT-OFF MACHINES
Challenge Machinery Co., The, Dept. TD, Grand Haven, Mich.
Delta Mfg. Co., 612-A E. Vienna Ave., Milwaukee 1, Wis.

CUTTERS—Boring
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

CUTTERS—Deburring
Severance Tool Industries, Inc., Dept. TD, Saginaw, Mich.

CUTTERS—Diamond Glass (See DIAMOND GLASS CUTTERS)

CUTTERS—Die Sinking
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

CUTTERS—Engraving
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Preis Engraving Co., H. P., 159-D Summitt St., Newark 4, N. J.

CUTTERS—Fly
Clark Co., Robert H., 9330 Santa Monica Blvd., Beverly Hills, Calif.

CUTTERS—Hand Power
Lewthwaite Machine Co., T. H., 314 E. 47th St., New York 17, N. Y.

CUTTERS—Hard Carbide
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.
Ford Mfg. Co., Inc., M. A., 739 W. 1st St., Davenport, Ia.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
National Twist Drill & Tool Co., Dept. TD, Detroit, Mich.
Pipe Machinery Co., The, 980 E. 70th St., Cleveland, O
Putnam Tool Co., 2985 Charlevoix Ave., Detroit 7, Mich.
Severance Tool Industries, Inc., Dept. TD, Saginaw, Mich.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CUTTERS—Thread Milling
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Pipe Machinery Co., 930 E. 70th St., Cleveland, O.
Sossner Tap & Tool Co., 161 Grand St., New York 13, N. Y.
Wesson Products Co., Dept. TD-4, 709 Fisher Bldg., Detroit 2, Mich.

CUTTERS—Wire Rope
Lewthwaite Machine Co., T. H., 314 E. 47th St., New York 17, N. Y.

CUTTING TOOLS—Cemented Carbide
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Wesson Products Co., Dept. TD, 709 Fisher Bldg., Detroit 2, Mich.

CUTTING TOOLS—Special
Continental Tool Wks., Div of Ex-Cell-O Corp., Dept. TD, Detroit 6, Mich.
Masterform Tool Co., 2540 Irving Park Rd., Chicago 18, Ill.
National Twist Drill & Tool Co., Dept. TD, Detroit, Mich.
Super Tool Co., 21650 Hoover Rd. Detroit 13, Mich.
Zimmerman Packing Co., Dept. TD, Cincinnati 2, Ohio

CYLINDERS—Air
Anker-Holth Mfg. Co., 2735 Connors St., Port Huron, Mich.
Mead Specialties Co., Dept. HA-445, 4114 No. Knox Ave., Chicago 41, Ill.
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

CYLINDERS—Hydraulic
Tomkins-Johnson Co., The, Dept. TD, Jackson, Mich.

DEMAGNETIZERS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Alofs Mfg. Co., 1619 Madison Ave., S. E. Grand Rapids, Mich.

DESIGNING AND DRAFTING
Buneli Machine & Tool Co., 1601 E. 23rd St., Cleveland 14, O.

DESIGNING & ENGINEERING
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.

DIALS—Etched Plastic
Eastern Etching & Mfg. Co., Dept. TD, Chicopee, Mass.

DIAMOND BORING TOOLS—(See BORING TOOLS—Diamond)

DIAMONDS—Industrial
Meyers Co., Inc., W. F., 1016 14th St., Bedford, Ind.

DIAMOND HONES
Carborundum Co., Dept. TD, Niagara Falls, N. Y.

DIAMOND POWDERS
Arc Abrasive Laboratories, 1 Spruce St., New York 7, N. Y.

DIAMOND TOOLS
Diamond Tool Co., Not Inc., 938 E 41st St., Chicago 15, Ill.
Koebel Diamond Tool Co., 9444 Grinnell Ave., Detroit 13, Mich.
Smit & Sons, Inc., J. K., 157 Chambers St., New York, N. Y.
Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit 6, Mich.

DIE CASTING MACHINES
Lester-Phoenix, Inc., 2625 Church Ave., Cleveland 13, O.

DIE CENTERS—Hard Carbide
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.

DIE FILING MACHINES
Illinois Tool Works, 2501 No. Keeler Ave., Chicago, Ill.
Milwaukee Chaplet & Mfg. Co., 1029 S. 40th St., Milwaukee 4, Wis.
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

DIE HANDLING TRUCKS
Hamilton Tool Co., The, Ninth & Hanover St., Hamilton, O.

DIE MAKERS' SUPPLIES
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis 4, Minn.
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Producto Machine Co., The, Dept. TD, Bridgeport 1, Conn.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.

DIE SECTIONS—Composite Steel
Allegheny Ludlum Steel Corp., Forging & Casting Div., Dept. TD, Detroit 20, Mich.
Firth-Sterling Steel Co., Dept. TD, McKeesport, Pa.

DIE SETS
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.

DIE STEEL (See STEEL—Tool & Die)

DIE STOPS—Automatic
West, R. C., 117 Fowler Ave., Kenmore, N. Y.

DIE SUBSTITUTE MACHINES
O'Neil-Irwin Mfg. Co., 315 8th Ave., So. Minneapolis 15, Minn.

DIES
Alofs Mfg. Co., 1619 Madison Ave., S. E. Grand Rapids, Mich.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Barth Stamping & Machine Works, W. 34th & Denison, Cleveland, O.
Bone Tool & Gauge Co., 9910 Freeland Ave., Detroit 27, Mich.
Davis Tool & Engineering Co., 19250 Plymouth Rd., Detroit, Mich.
Denning Mfg. Co., The, 1775-81 E. 87th St., Cleveland, O.
Dresel-Betz Co., Dept. TD, Belleville, Ill.
General Die & Tool Co., 2067 W. 55th St., Cleveland, O.
Hartley Wire Die Co., 14 Elm St., Thomaston, Conn.
Lorain Machine & Tool Co., The, 1951 W. 90th St., Cleveland, O.
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.
National Machine Tool Co., 1536 Clark St., Racine, Wis.
Paramount Tool Co., 1392-98 E. 43rd St., Cleveland, O.
Rane Tool Co., Inc., 17 Ross St., Jamestown, N. Y.
Schraner & Co., A. P., 3838 Payne Ave., Cleveland, O.
Triangle Engineering Co., 410 E. 9 Mile Rd., Detroit, Ferndale 20, Mich.
Variety Machine & Stamping Co., 12695 Elmwood Ave., Cleveland, O.
Viking Tool & Machine Corp., The, 6 Main St., Belleville, N. J.
Whistler & Sons, Inc., S. B., 752-756 Military Rd., Buffalo, N. Y.

DIES—Bolt
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DIES—Carbide
Firth-Sterling Steel Co., McKeesport, Pa.

DIES—Die Casting
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.

DIES—Forming
Algoma Products, 3080 E. Outer Dr., Detroit 12, Mich.

DIES—Master Washer
Hovis Screwlock Co., 8100 E. Nine Mile Rd., Van Dyke, Mich.

DIES—Pipe
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DIES—Plastic Molding
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.

DIES—Press Brake
Dreis & Krump Mfg. Co., 7423 S. Loomis Blvd., Chicago 36, Ill.

DIES—Punch Press
Federal Tool Corp., 412 No. Leavitt St., Chicago 12, Ill.

DIES—Punching & Notching
Whistler & Sons, Inc., S. B., 752-756 Military Rd., Buffalo, N. Y.

DIES & STOCK SETS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DIES—Template
Algoma Products, 3080 E. Outer Dr., Detroit 12, Mich.

DIES—Threading
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DISCS—Abrasive
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.

DIVIDERS
Lufkin Rule Co., Saginaw, Mich.
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

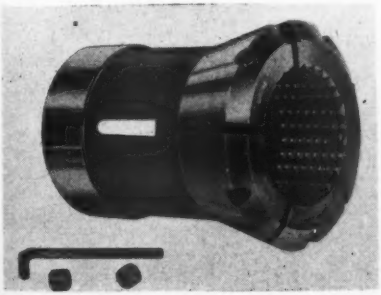
DOGS—Lathe & Milling Machine
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DOWEL PINS
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.

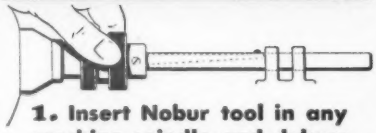
Sheffer "Super-Grip" Collets

Super-Grip collets, made by the Sheffer Collet Company, Dept. TD, West Bay St., Traverse City, Mich., are especially effective for handling hot-rolled steel and for use on jobs where heavy tool thrusts might cause slippage. Sheffer Super-Grip collets have within each serrated section a cup-point lug which, in its locked position, slightly penetrates the stock thus preventing it from turning or pushing back into the collet. The lugs are usually set .010" to .015" beyond the regular serrations. They can be adjusted for more or less penetration or backed away completely without removing the collet from the machine. One Super-Grip collet often outlasts two ordinary collets because lug replacements are most inexpensive. Since less locking tension is required to hold the stock firmly, the life of the collet and the machine mechanism is materially increased. Sheffer Super-Grip collets are recommended for stock sizes of 2" and larger. Sheffer collets are made of a high grade alloy steel which is heat treated with equipment set up for this special job and to produce best hardening results. They are accurately concentric, finished to close tolerances and carefully inspected. Sheffer collets embody the long wearing Sheffer design of serrations. At the gripping point they are square, resulting in maximum resistance to thrust from any direction. This results in long collet life without the changing of size or broadening which permits slippage. This type of serration was developed over years of experimentation.

INFORM-A-GRAM KEY No. D34-Z

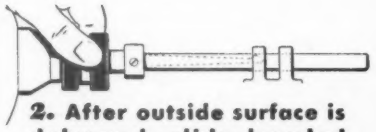


How to deburr holes faster!

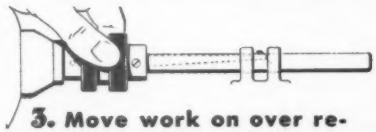


1. Insert Nobur tool in any machine spindle and deburr outside surface of work.

Works like a drill—operator works with complete safety—parts can be burred as fast as they can be handled by operator.



2. After outside surface is deburred, slide knurled sleeve back to retract blade.



3. Move work on over retracted blade and deburr inside surface.

Double-edged cutting blade thus instantly removes burrs around holes in flat or curved surfaces of single or multi-walled parts—smoothly and accurately.

Send for deburring folder. Write

NOTE
All Nobur tools are now furnished with pilot shafts hard chrome plated!

NOBUR MANUFACTURING CO.
912 NO. ORANGE DRIVE
LOS ANGELES 38, CALIFORNIA

Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Producto Machine Co., The, 999 Housatonic Ave., Bridgeport 1, Conn.

DRAWBARS
General Die & Stamping Co., 262-272 Mott St., New York 12, N. Y.

DRESSERS—Angle
J & S Tool Co., 477 Main St., East Orange 4, N. J.

DRESSERS—Diamond
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Meyers Co., Inc., W. F., 1012 14th St., Bedford, Ind.

DRESSERS—Radius
J & S Tool Co., 477 Main St., East Orange 4, N. J.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

DRESSERS—Wheel
Lee Co., K. O., Dept. TD, Aberdeen, S. D.

DRESSING STICKS
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.

DRILL DRIFTS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DRILL JIG BUSHINGS
Acme Industrial Co., 208 No. Laflin St., Chicago 7, Ill.
Colonial Bushings, Inc., 145 Jos. Campau St., Detroit, Mich.

DRILL POINTERS
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

DRILL PRESS (See PRESSES—Drill)

DRILL ROD
Allegheny Ludlum Steel Corp., Dept. TD, Brackenbridge, Pa.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Latrobe Electric Steel Co., Latrobe, Pa.

DRILLING ATTACHMENTS
Rusnok Tool Works, 4840 North Ave., Chicago 39, Ill.

DRILLING—Disintegrator
Elox Corp., 3-252 General Motors Bldg., Detroit 2, Mich.

DRILLING HEADS—Adjustable
Linderme Machine & Tool Co., Inc., 12550 Coyle Ave., Detroit 27, Mich.

DRILLING HEADS—Turret
Madco Products, Inc., 516 Fifth Avenue, New York 18, N. Y.

DRILLING MACHINES
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

DRILLING POSTS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DRILLING & REAMING MACHINES—Deep Hole
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.

DRILLS—Carbide Tipped
Goral Tool Co., 5020 E. McNichols Rd., Detroit 12, Mich.

DRILLS—Core
Ex-Cell-O Corp., 1200 Oakman Ave., Detroit 6, Mich.

DRILLS—Hardsteel
Black Drill Co., 1400 E. 222 St., Cleveland 17, O. (Div. Black Industries)
Die Supply Co., 4751 Hough Ave., Cleveland, O.

DRILLS—High Speed, Straight Shank
Eastern Tool Supply Co., 176 Grand St., New York 13, N. Y.

DRILLS—Oil Hole
Detroit Reamer & Tool Co., 2830 7 Mile Rd., Detroit 12, Mich.

DRILLS—Ratchet
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

DRILLS—Tool-Forged
Republic Drill & Tool Co., Chicago 7, Ill.

DRILLS—Sensitive
Production Machine Co., Dept. TJ, Greenfield, Mass.

DRILLS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

DRILLS—Twist
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
National Twist Drill & Tool Co., 6522 Brush Ave., Detroit, Mich.

DRIVES—Gearshift
Lima Electric Motor Co., The, 804 Findlay Rd., Lima, O.

DRIVES—Motorized
Master Electric Co., Industrial Equipment Div., Dayton, O.

DUPLICATOR MACHINES
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
O'Neil-Irwin Mfg. Co., 315 8th Ave., Minneapolis 15, Minn.

DUPLICATORS
Detroit Universal Duplicator, 723 E. Milwaukee, Detroit 2, Mich.
Turchan Follower Machine Co., 8257 Livernois, Detroit 4, Mich.

DUST COLLECTORS
Acme Tool Co., 196 Church St., New York 13, N. Y.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

EDGER—Straight
Acme Tool Co., 196 Church St., New York 13, N. Y.
Challenge Machinery Co., The, Grand Haven, Mich.
Ford Motor Co., Johansson Div., Dearborn, Mich.

ELEVATORS—Portable
Economy Engineering Co., 2659 W. Van Buren St., Chicago 12, Ill.

END MILLS
Bokum Tool Co., 14775 Wildermere Ave., Detroit 21, Mich.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Putnam Tool Co., 3985 Charlevoix Ave., Detroit 7, Mich.
Slewek Tool Div. of Domestic Industries, Inc., 231 S. LaSalle Street, Chicago 4, Ill.
U. S. Machine Tool Mfg. Corp., 100 So. 6th St., Clinton, Ind.
Wesson Products Co., Dept. TD-4, Ferndale, Mich.

END MILLS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

ENGINEERING SERVICE
Erickson Steel Co., 2309 Hamilton Ave., Cleveland 14, O.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.

ENGRAVING MACHINES
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

ETCHERS—Acid, Pantographic
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

ETCHERS—Electric
Acme Tool Co., 196 Church St., New York 13, N. Y.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

ETCHING INK
Dykem Co., The, 2201 No. 11th St., St. Louis, Mo.

EXPERIMENTAL WORK
Mers Engineering Co., Indianapolis 7, Ind.

FACERS
Clark Co., Robert H., 9330 Santa Monica Blvd., Beverly Hills, Calif.

FEED FINGERS
Hardinge Brothers, Inc., Elmira, N. Y.

FEEDS—Air Operated
Bellows Co., The, 867 E. Tallmadge Ave., Akron 10, O.
Mead Specialties Co., 4114 No. Knox Ave., Chicago 41, Ill.

FEEDS—Die
Dickerman Mfg. Co., H. E., 321 TD, Albany St., Springfield, Mass.

FEEDS—Hitch
Dickerman Mfg. Co., H. E., 321 TD, Albany St., Springfield, Mass.
Die Supply Co., 4751 Hough Ave., Cleveland, O.

FILES—Ebonite
Heller Brothers Co., Dept. TD, Newark 4, N. J.

FILES—Rotary
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Ford Mfg. Co., Inc., M. A., 739 W. 1st St., Davenport, Ia.
Grobet File Co. of America, 421 Canal St., New York 13, N. Y.
Hamilton Tool Co., The, Ninth & Hanover Sts., Hamilton, O.
Heller Brothers Co., Dept. TD, Newark 4, N. J.
Nicholson File Co., 95 Acorn St., Providence 1, R. I.
Severance Tool Industries, Inc., 1506 E. Genesee Ave., Saginaw, Mich.

FILES—Swiss Pattern
Grobet File Co. of America, 421 Canal St., New York 13, N. Y.

FILING MACHINES—Continuous
Continental Machines, Inc., 1301 Washington Ave., So., Minneapolis 4, Minn.

FILING MACHINES—Die
Illinois Tool Works, 2501 No. Keeler Ave., Chicago, Ill.
Milwaukee Chaplet & Mfg. Co., 1029 S. 40th St., Milwaukee 4, Wis.
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

FILTERS—Air Line
M-B Products, 130-134 E. Larned St., Detroit 26, Mich.

FIXTURES
Bone Tool & Gauge Co., 9910 Freeland Ave., Detroit 27, Mich.
Cleveland Universal Jig Co., 13404 St. Clair Ave., Cleveland, O.
Dresel-Betz Co., Dept. TD, Bellevills, Ill.
Electrix Corp., 156 Middle St., Pawtucket, R. I.
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.
General Die & Tool Co., 2067 W. 55th St., Cleland, O.
Lorain Machine & Tool Co., The, 1951 W. 90th St., Cleveland, O.
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
McKinney Tool & Mfg. Co., 1673 Arabella Rd., Cleveland 12, O.
Mers Engineering Co., Indianapolis 7, Ind.
Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn.
Paramount Tool Co., 1392-98 E. 43rd St., Cleveland, O.
Sosnow Tap & Tool Co., 161 Grand St., New York 13, N. Y.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.
Ulmer Co., The J. C., 1791 E. 38th St., Cleveland 14, O.
Viking Tool & Machine Corp., The, 6 Main St., Belleville, N. J.
Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

FIXTURES—Broaching (See BROACHING FIXTURES)

FIXTURES—Grinding (See GRINDING FIXTURES)

FLEXIBLE SHAFTS
Precise Products Co., 1341 Clark St., Racine, Wis.

FLEXIBLE SHAFT MACHINES
Acme Tool Co., 196 Church St., New York 13, N. Y.

FLOATING HOLDERS
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.

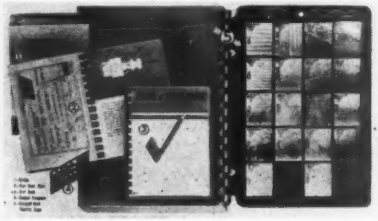
FORGINGS—Steel
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.

FORGINGS—Water & Oil Hardening
Allegheny Ludlum Steel Corp., Forging & Casting Div., Dept. TD, Detroit 20, Mich.

FORMERS—Wheel & Tool
Meyers Co., W. F., Inc., 1012 14th St., Bedford, Ind.

Surf-Chek Standards

Surf-Chek Roughness Standards made by the Surface Checking Gage Co., Dept. DJ, Hollywood 28, Calif., is a development of J. A. Broadston of North American Aviation, Inc., for meeting the trend toward ever increasing uniformity in surface control. Produced at low cost, the kit contains a 65-page educational text bound to a reference gage consisting of twenty replicas of machined surfaces, prepared by turning, grinding, milling, honing, lapping and polishing, which vary in roughness from 500 to 5 micro-inches. The replicas are molded into a 5" x 7" plastic plate through the use of precise die inserts. In the past, finish designations have often been expressed only by individual opinions. The Surf-Chek method of designation eliminates guess interpretation, conveys the engineer's specific instructions to the machinist, and enables anyone to make rapid and efficient roughness comparisons without the need of any other special instruments. Industrialists, who are adopting the new system on a nationwide scale, report stepped-up production, increased efficiency and reduced rejects.



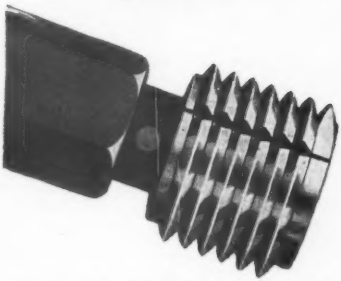
INFORM-A-GRAM KEY No. D88-Z

★

Further recognition for outstanding production of Diesel engines came to the Cooper-Bessemer Corp. recently in the announcement that its Grove City, Pa., plant has been awarded a second renewal on its Army-Navy E originally presented April 8th last year.

In addition to the E pennant with two stars the 112-year-old concern flies a five-starred Maritime M.

That Unseen Extra Quality



A Golf Champ Has it—
The NEW V-nide Has it

You can't see that Unseen Extra Quality but it's there, in each gage, forcing the "Cost per hole gaged" down and down. Actual production tests on cast aluminum have shown up to 13.4 times more wear than tool steel gages. See what they'll do for you. Available in "W" tolerance.

Republic Gage Co.

2228 Fenkell Ave., Detroit 21, Mich.

FORMING TOOLS
Cooper-Bessemer Corp., The, Dept. J. Mount Vernon, O.
Hardinge Brothers, Inc., Elmira, N. Y.
Wesson Products Co., Dept. TD-4, Ferndale, Mich.
Wheel Trueing Tool Co., 3200 W. Davison, Detroit 6, Mich.

FORMING TOOLS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.

FURNACE HEATING ELEMENTS—Electric
Carborundum Co., Niagara Falls, N. Y.

FURNACE REFRACTORIES
Carborundum Co., Niagara Falls, N. Y.

FURNACES—Case Hardening
Cooley Electric Mfg. Corp., 32 So. Shelby St., Indianapolis 7, Ind.
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.

FURNACES—Electric Heat Treating
Cooley Electric Mfg. Corp., 32 So. Shelby St., Indianapolis 7, Ind.
Thermo Electric Co., 474 W. Locust St., Dubuque, Ia.

FURNACES—High Speed Steel
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.

FURNACES—Laboratory
Cooley Electric Mfg. Corp., 32 S. Shelby St., Indianapolis 7, Ind.
Thermo Electric Co., 474 W. Locust St., Dubuque, Ia.

FURNACES—Melting
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.

FURNACES—Soldering
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.
Yost Mfg. Co., 1000 Main St., Meadville, Pa.

FURNACES—Tempering & Drawing
Cooley Electric Mfg. Corp., 32 So. Shelby St., Indianapolis 7, Ind.
Johnson Gas Appliance Co., 575 E Ave., N.W., Cedar Rapids, Ia.

GAGE BLOCKS
Dearborn Gage Co., 22035 Beech St., Dearborn, Mich.
Ford Motor Co., Johansson Div., Dearborn, Mich.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
Webber Gage Co., 12903 Triskett Rd., Cleveland 11, O.

GAGE HANDLES
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.
Great Lakes Metal Specialties & Mfg. Co., 1448 W. North Ave., Chicago 22, Ill.

GAGE TOOLS
Wheel Trueing Tool Co., 3200 W. Davison, Detroit 6, Mich.

GAGES—Built-Up
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.
Turner Gauge Grinding Co., 2625 Hilton Rd., Ferndale 20, Mich.
Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

GAGES—Carbide Tipped
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.

GAGES—Center, Depth, Planer, Telescoping, Surface, Thickness, etc.
Lufkin Rule Co., Saginaw, Mich.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.

GAGES—Concentricity
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.

GAGES—Contour
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.

GAGES—Cylindrical
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.

GAGES—Depth
Lassy Tool Co., 96 Bohemia St., Plainville, Conn.

GAGES—Dial
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.
Sun Tool & Gauge Corp., 380 Canal St., New York, N. Y.

GAGES—Fixture
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.

GAGES—Flush Pin
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.
Turner Gauge Grinding Co., 2625 Hilton Rd., Ferndale 20, Mich.

GAGES—Grinding
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.

GAGES—Height
Dickerman Mfg. Co., H. E., 321 TD, Albany St., Springfield, Mass.

GAGES—I.D. & O.D.
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.

GAGES—Inspection
Comtor Co., The, 82 Rumford Ave., Waltham, Mass.

GAGES—Internal Indicator Bore
Swedish Gage Co. of America, 8900 Alpine Ave., Detroit 4, Mich.

GAGES—Internal Setting
Dearborn Gage Co., 22035 Beech St., Dearborn, Mich.

GAGES—Master Disks
Swedish Gage Co. of America, 8900 Alpine Ave., Detroit 4, Mich.

GAGES—Micrometer Dial
Ames Co., B. C., Waltham, Mass.

GAGES—Multiple Inspection
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.

GAGES—Plain Plug & Ring
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Elgin National Watch Co., 932 Benton St., Aurora, Ill.
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
Merz Engineering Co., Indianapolis 7, Ind.
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Saw-Way Industries, Box 117, Harper Sta., Detroit 13, Mich.
Swedish Gage Co. of America, 8900 Alpine Ave., Detroit 4, Mich.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.
Turner Gauge Grinding Co., 2625 Hilton Rd., Ferndale 20, Mich.
Vard, Inc., Dept. TD, Pasadena 8, Calif.
Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

GAGES—Precision
Bunell Machine & Tool Co., 1601 E. 23rd St., Cleveland 14, O
Gage Co. Division, Dept. TD, Battle Creek, Mich.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.
Turner Gauge Grinding Co., 2625 Hilton Rd., Ferndale 20, Mich.
Woodworth Co., N. A., 1300 E. 9 Mile Rd., Detroit 20, Mich.

GAGES—Profile
Gage Co. Division, Dept. TD, Battle Creek, Mich.
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.

GAGES—Snap
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.
Tubular Micrometer Co., Dept. TD, St. James, Minn.
Turner Gauge Grinding Co., 2625 Hilton Rd., Ferndale 20, Mich.
Vard, Inc., Dept. TD, Pasadena 8, Calif.

GAGES—Special
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.
Barth Stamping & Machine Works Denison & W. 34th St., Cleveland, O.
Federal Tool Corp., 400 N. Leavitt St., Chicago 12, Ill.
Griffin Co., George O., 1301 W. Hadley St., Whittier, Calif.
Lorain Machine & Tool Co., The, 1951 W. 90th St., Cleveland, O.
Metrical Laboratories, Inc., Dept. TD, Ann Arbor, Mich.
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Sun Tool & Gauge Corp., 380 Canal St., New York, N. Y.
Swedish Gage Co. of America, 8900 Alpine Ave., Detroit 4, Mich.
Triangle Engineering Co., 410 E. 9 Mile Rd., Detroit, Ferndale 20, Mich.
Turner Gauge Grinding Co., 2625 Hilton Rd., Ferndale 20, Mich.
Ulmer Co., The J. C., 1791 E. 39th St., Cleveland 14, O.
Vard, Inc., Dept. TD, Pasadena 8, Calif.
Viking Tool & Machine Corp., The, 6 Main St., Belleville, N. J.
Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

GAGES—Telescoping
Brand Tool & Supply Co., Flower at Washington, Los Angeles 15, Calif.
Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich.
Federal Products Corp., 1144 Eddy St., Providence 1, R. I.
Merz Engineering Co., Indianapolis 7, Ind.
Sossner Tap & Tool Co., 161 Grand St., New York 13, N. Y.
Tools & Gages Inc., 3112 E. 63rd St., Cleveland 4, O.

GAGES—Thread Plug & Ring
Cadillac Gage Co., 20316 Hoover Rd., Detroit 5, Mich.
Elgin National Watch Co., 932 Benton St., Aurora, Ill.
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
Perfex Gage & Tool Co., 3604 Gaylord Ave., Detroit 12, Mich
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
Vard, Inc., Dept. TD, Pasadena 8, Calif.
Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

GAGES—Tool Setting
Bartell Engineering Co., 1212 Partridge Ave., Beloit, Wis.
Tools & Gages, Inc., 3112 E. 63rd St., Cleveland 4, O.

GEAR BOXES
Western Aircraft Tool Co., 650 N. Hoover St., Los Angeles 4, Calif.

GEARS
Hartford Special Machinery Co., The, 281 Homestead Ave., Hartford, Conn.
Taylor Machine Co., 1917 E. 61st St., Cleveland 3, O.

GRADUATORS
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

GRINDER TOOLS
Norton Co., Worcester 6, Mass.
Clark Co., Robert H., 9330 Santa Monica Blvd., Beverly Hills, Calif.

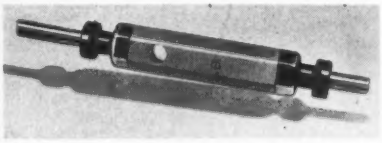
GRINDERS—Abrasive Band & Disc
Walls Sales Corp., 97 Warren St., New York, N. Y.

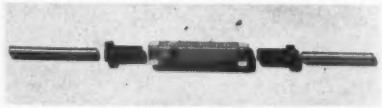
GRINDERS—Attachments
Cincinnati Grinders, Inc., Cincinnati, O.

GRINDERS—Automatic Cycle
Cincinnati Grinders, Inc., Cincinnati, O.

Plast-O-Lock Gages

This new collet-type gage made by Turner Gauge Grinding Co., Dept. T, 2625 Hilton Rd., Ferndale, Mich., has a multiplied service life compared to many standard plug gages. Plast-O-Locks are available in plug sizes from .050" to .690", though the range can be lowered to .029". Each Go and No Go end is 2" long. Plast-O-Lock's main feature is a plastic collet, slotted and tapered to fit the tapered end of a standard gage holder. The collet shoulder receives an end wrench, and a thin slot runs the full length of the collet to take up slack in the locked position. Two narrow, shallow and flat surfaces on the taper provide for dimensional adjustment. Hand pressure on the collet is sufficient to lock the gage in the holder and a partial turn of the end wrench unlocks it for reversal or resetting to any desired length. The plugs are longer than was formerly offered in a collet-type plug because this non-scratching plastic holder will not scratch or "burr" the gaging surfaces and thus it preserves the full length of the plugs for checking. The reversible feature alone provides Plast-O-Lock with a minimum life of double a standard plug gage, and a normal life expectancy several times greater where shallow holes are checked. Gaging ends which are worn beyond tolerance may be simply cut off and the unused sections become available for further gaging. Red plastic collets designate the No Go ends. These plastic gage holders result in a much lighter gaging combination and provide a more sensitive feel or touch.





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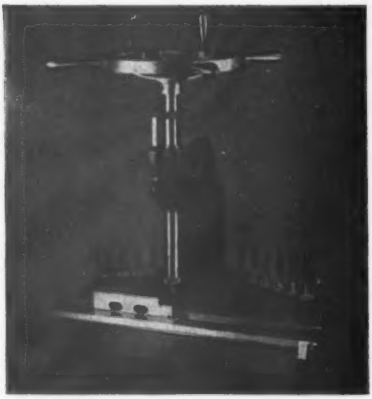


Lassy TAPPER
PATENTS PENDING

SAVES TIME, TAPS, EXPENSIVE LABOR

1. HOLDING BARS eliminate need of vise. Hold work firmly. Prevent Tap breaking torque.
2. TAP ADAPTERS do away with extra spindles. Change taps in a jiffy.
3. DEPTH GAUGE always visible. Prevents freezing taps in blind holes Adjusted in an instant. No lost time on over tapping depth.

LASSY DEPTH GAUGE

Cuts tap breakage. Set tap in hole, set gauge at zero, ready for tapping to depth required.

Lassy Precision V Block Angle Iron Model 15
PATENTS PENDING

For rapid accurate inspection, layout, jig boring and grinding. Hardened, normalized, ground

LASSY TOOL COMPANY
96 Bohemia Street
PLAINVILLE, CONN.

GRINDERS—Bench & Pedestal
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Sanford Mfg. Co., 1279-81 Springfield Ave., Irvington 11, N. J.
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Carbide Tool
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.
Lee Co., K. O., Dept. TD, Aberdeen, S. D.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—Centerless & Center Type
Cincinnati Grinders, Inc., Cincinnati, O.

GRINDERS—Chip Breaker
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Lee Co., K. O. Aberdeen, S. D.

GRINDERS—Combination Twist Drill & Tap
Gallmeyer & Livingston Co., 304 Straight Ave., S. W., Grand Rapids 4, Mich.

GRINDERS—Cutter & Tool Attachments
Cincinnati Milling Machine Co., Cincinnati 9, O.

GRINDERS—Crankshaft
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.

GRINDERS—Cylindrical
Cincinnati Grinders, Inc., Cincinnati, O.
J & S Tool Co., 477 Main St., E. Orange 4, N. J.
Norton Co., Worcester 6, Mass.

GRINDERS—Die
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Disc
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—Engraving Cutter
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

GRINDERS—External
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Face
Oliver Instrument Co., 1436 Maumee St., Adrian, Mich.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—General Purpose
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—Hand (See GRINDERS—Portable)

GRINDERS—Heavy Duty
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—Hydraulic
Cincinnati Grinders, Inc., Cincinnati, O.
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.

GRINDERS—Internal
Abrasive Machine Tool Co., E. Providence 14, R. I.
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.
Sav-Way Industries, P. O. Box 117, Harper Sta., Detroit 13, Mich.
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Plain, Center Type
Cincinnati Grinder, Inc., Cincinnati, O.

GRINDERS—Portable
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.
Dumore Co., The, Dept. TC-42, Racine, Wis.
Foredom Electric Co., 27 Park Pl., New York 7, N. Y.
Precise Products Corp., 1341 Clark St., Racine, Wis.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—Portable Pneumatic
M-B Products, 130 E. Larned St., Detroit 26, Mich.

GRINDERS—Precision for Contours
Baker Bros., Inc., Toledo 10, O.
Dumore Co., The, Dept. TF-42, Racine, Wis.

GRINDERS—Profile
Boyar-Schultz Corp., 2112-C Walnut St., Chicago 12, Ill.

GRINDERS—Ring Wheel
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6 Ill
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

GRINDERS—Snagging
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Stationary Pneumatic
M-B Products, 130 E. Larned St., Detroit 26, Mich.

GRINDERS—Surface
Abrasive Machine Tool Co., East Providence 14, R. I.
Builders Iron Foundry, 23 Codding St., Providence 1, R. I.
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Norton Co., Worcester 6, Mass.
Sanford Mfg. Co., 1279-81 Springfield Ave., Irvington 11, N. J.

GRINDERS—Tap
Boggis & Co., Henry P., 1277 W. 3rd St., Cleveland, O.
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.
Minn-Kota Foundry & Mfg. Co., Dept. 805, Fargo, N. D.

GRINDERS—Tool Bit
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

GRINDERS—Tool & Cutter
Boyar-Schultz Corp., 2112-C Walnut St., Chicago 12, Ill.
Cincinnati Milling Machine Co., Cincinnati 9, O.
Cleveland Tool Engineering Co., The, 1261H W. 4th St., Cleveland, O.
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Norton Co., Worcester 6, Mass.
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.
Production Machine Co., Dept. TJ, Greenfield, Mass.
Production Machinery Development Co., 4849 St. Aubin Ave., Detroit 7, Mich.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

GRINDERS—Tool Post
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Twist Drill
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.

GRINDERS—Universal
Cincinnati Grinders, Inc., Cincinnati, O.
Norton Co., Worcester 6, Mass.
Production Machine Co., Dept. TJ, Greenfield, Mass.
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.

GRINDERS—Universal Tool & Cutter
Cincinnati Milling Machine Co., Cincinnati 9, O.
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
Gallmeyer & Livingston Co., 304 Straight Ave., S.W., Grand Rapids 4, Mich.
Lee Co., K. O., Dept. TD, Aberdeen, S. D.

GRINDERS—Utility
M-B Products, 130-134 E. Larned St., Detroit 26, Mich.

GRINDERS—Vertical Spindle
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDERS—Wet Tool
Standard Electrical Tool Co., The, Cincinnati 4, O.

GRINDING & LAPPING—Precision
Acme Industrial Co., 306 No. Laflin St., Chicago 7, Ill.
J & S Tool Co., 477 Main St., E. Orange 4, N. J.

GRINDING (Cylindrical) & POLISHING MACHINES
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.

GRINDING WHEELS
Carborundum Co., The, Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.
DeSanno & Sons, A. P., 464 Wheatland St., Phoenixville, Pa.
Norton Co., Worcester 6, Mass.

GUIDE PINS
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.
Die Supply Co., 4751 Hough Ave., Cleveland, O.

HAMMERS—Board Drop
Chambersburg Engineering Co., Chambersburg, Pa.

HAMMERS—Rawhide
Chicago Rawhide Mfg. Co., 1280 Elston Ave., Chicago, Ill.

HAMMERS—Replaceable Face
Greene, Tweed & Co., Bronx Blvd., 238 St., New York 66, N. Y.

HAMMERS—Single & Double Frame Forging
Chambersburg Engineering Co., Chambersburg, Pa.

HAMMERS—Soft Alloy
Industrial Products Suppliers, 106 Water St., New York 5, N. Y.

HAMMERS—Steam Drop
Chambersburg Engineering Co., Chambersburg, Pa.

HAMMERS—Steel Inspector
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.

HANDLES—Gage
Tanzi Engineering Co., Aurelio, 430 Jefferson St., Brooklyn 6, N. Y.

HARD SURFACING
Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

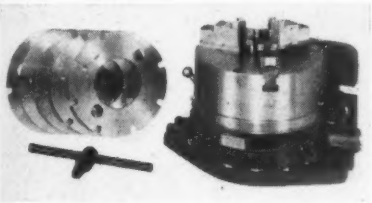
HARDNESS TESTERS
Ames Co., B. C., Waltham, Mass.
Clark Instrument, Inc., 10200 Ford Rd., Dearborn, Mich.
Shore Instrument & Mfg. Co., Inc., The, 9025 Van Wyck Ave., Jamaica, N. Y.
Wilson Mechanical Instrument Co., Inc., 371 Concord Ave., New York 54, N. Y.

HEADS—Boring (See BORING HEADS)

HEADS—Dividing
Cincinnati Milling Machine Co., Cincinnati 9, O.

Hartford Super-Spacer

The Hartford Super-Spacer, introduced by the Hartford Special Machinery Company, Dept. DJ, Hartford 5, Conn., is a sturdy, direct indexing fixture for accurately locating work for machining operations at spaced angular positions. A three-jaw self-centering chuck has proved a convenient holder for average work and is standard equipment with the Hartford Super-Spacer. Other jaw chucks, collet chucks and a faceplate are available, although without a chuck or faceplate, the Super-Spacer provides a substantial and accurate indexing foundation for special fixtures at a minimum cost. Errors in indexing are prevented by blocking off unwanted notches in the master index plate with interchangeable mask plates. A 24-notch master index plate and mask



plates for 2, 3, 4, 6, 8, and 12 divisions are Super-Spacer standard equipment, while master plates for other divisions and mask plates can be furnished. Original indexing accuracy is preserved by means of a strong clamp which relieves the index plate and plunger of all strain by binding the turret solidly to the base. A drilling attachment for spaced axial holes in discs, flanges, etc., may be furnished as an extra accessory which can be quickly set up and will often save the cost of a special jig. A supplemental base for peripheral drilling is available. The Hartford Super-Spacer is approximately 12″ long, 10″ wide and weighs about 95 lbs. It mounts an 8″ diameter chuck. A circular illustrating and describing the Super-Spacer and showing a few of its typical applications may be had from the manufacturer.

When requesting information, please use postage-free Inform-a-gram card on page 146-A.

INFORM-A-GRAM KEY No. 575-Z

MADCO'S *New* Turret Drill Head

—Complete with Indexing Depth Stop

Model C-275 for 17″ Delta Drill Press

Check these features:

1. Easily attached to 14″ and 17″ Deltas, 15″ and 20″ Buffalos, 15″ Walker-Turners; and to Allens, Sipps and many other make drill presses.
2. New Indexing Depth Stop accurately controls drilling depth of each spindle.
3. *Six* precision ground hollow spindles with *No. 1 Morse Taper*, provide interchangeability of tools.
4. Accurate, friction type driving member—*no gears*.
5. Light weight, but sturdy aluminum alloy construction.
6. Completely enclosed ball bearings—no lubrication needed.
7. Accuracy guaranteed to .001″.

Write today for complete details

$123.00

and up depending on model and accessories

◀ *Operator adjusting Indexing Depth Stopon MADCO Turret Head.*

MADCO PRODUCTS, INC.
516 FIFTH AVENUE
NEW YORK 18, N. Y.

HEADS—Milling
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

HEAT TREATING
Perfection Tool & Metal Heat Treating Co., 1740-58 W. Hubbard St., Chicago 22, Ill.

HOBBERS—Gear (See GEAR HOBBERS)

HOBS—Hook Checking Machine For
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.

HOBS—Thread
Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Mich.

HOBS—Thread Milling
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.
U. S. Machine Tool Mfg. Corp., 100 So. 6th St., Clinton, Ind.

HOLDERS—Adjustable
Ford Motor Co., Johansson Div., Dearborn, Mich.

HOLDERS—Broach (SEE BROACH HOLDERS)

HOLDERS—Drill
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Rusnok Tool Works, 4840 North Ave., Chicago 39, Ill.

HOLDERS—Steel for Number
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.

HOLDERS—Tap
Procunier Safety Chuck Co., 12-14 So. Clinton St., Chicago, Ill.

HOLDERS—Tool
Acme Tool Co., 196 Church St., New York 13, N. Y.
Allison Tool & Engraving Co., 4031 Whittier Blvd., Los Angeles 23, Calif.
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Boyar-Schultz Corp., 2112-C Walnut St., Chicago 12, Ill.
Dearborn, Inc., Howard, 3370 W. 140 St., Cleveland 11, O.
Gairing Tool Co., The, P. O. Box 478, Roosevelt Park Annex, Detroit 32, Mich.
Wesson Products Co., Dept. TD-4, Ferndale, Mich.

HOLDING FIXTURES
Zagar Tool, Inc., 23881 Lakeland Blvd., Cleveland, O.

HONING—Contract
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.

HONING MACHINES—Cylindrical
Automotive Maintenance Machinery Co., (Ammco), 2100 Commonwealth Ave., No. Chicago, Ill.

HONING MACHINES—Horizontal
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.
Sunnen Products Co., 7947 Manchester Ave., St. Louis 17, Mo.

HOUSINGS—Aluminum Sheet
Conrad & Moser, 2-23 Borden Ave., Long Island City, N. Y.

HYDRAULIC MACHINERY
Peerless Machine Co., Dept. TD 545, Racine, Wis.
Rockford Machine Tool Co., Dept. TD, Rockford, Ill.

IDENTIFICATION COLORS
Dykem Co., The, 2201 No. 11th St., St. Louis, Mo.

INDEX BASES
Allison Tool & Engineering Co., 4031 Whittier Blvd., Los Angeles 23, Calif.

INDEXING DEVICES
Hartford Special Machinery Co., The, 281 Homestead Ave., Hartford, Conn.

INDEXING FIXTURES
Zagar Tool, Inc., 23881 Lakeland Blvd., Cleveland, O.

INDEXING HEADS—Universal
Cleveland Tool Engineering Co., The, 1261H W. 4th St., Cleveland, O.

INDICATORS
Lufkin Rule Co., Saginaw, Mich.

INDICATORS—Dial
Ames Co., B. C., Waltham, Mass.
Federal Products Corp., 1244 Eddy St., Providence 1, R. I.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

INSPECTION DEVICES
Bartelt Engineering Co., 1212 Partridge Ave., Beloit, Wis.

IRONS—Angle
Challenge Machinery Co., The, Grand Haven, Mich.

JACKS—Machine
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.

JIG BORERS
DeVlieg Machine Co., 450 Fair Ave., Ferndale 20, Mich.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Lorain Machine & Tool Co., The, 1951 W. 90th St., Cleveland, O.
Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn.

JIG GRINDERS
Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn.

JIGS
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.
Bunell Machine & Tool Co., The, 1601 E. 23rd St., Cleveland 14, O.
Cleveland Universal Jig Co., 13404 St. Clair Ave., Cleveland, O.
Dresel-Betz Co., Dept. TD, Belleville, Ill.
Electrix Corp., 156 Middle St., Pawtucket, R. I.
Enterprise Machine Parts Corp., The, 2731 Jerome Ave., Detroit, Mich.
Federal Tool Corp., 400 No. Leavitt St., Chicago 12, Ill.
General Die & Tool Co., 2067 W. 55th St., Cleveland, O.
Lorain Machine & Tool Co., The, 1951 W. 90th St., Cleveland, O.
Master Gauge Co., 2218 Fenkell Ave., Detroit 21, Mich.
McKinney Tool & Mfg. Co., The, 1673 Arabella Rd., Cleveland 12, O.
Merz Engineering Co., Indianapolis 7, Ind.
Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Conn.
National Machine Tool Co., 1536 Clark St., Racine, Wis.
Paramount Tool Co., 1392-98 E. 43rd St., Cleveland, O.
Rockford Die & Tool Works, Inc., 1816 17th Ave., Rockford, Ill
Schraner & Co., A. P., 3838 Payne Ave., Cleveland, O.
Slewek Tool Div. of Domestic Industries, Inc., 231 S. LaSalle St., Chicago 4, Ill.
Star Machine & Tool Co., 9320 Woodland Ave., Cleveland, O.
Ulmer Co., The J. C., 1791 E. 38th St., Cleveland 14, O.
Viking Tool & Machine Corp., The, 6 Main St., Belleville, N. J.

KEY SETS
Holo-Krome Screw Corp., The, Hartford 10, Conn.

KEYS—Socket Screw
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Holo-Krome Screw Corp., The, Hartford 10, Conn.

KNEES—Toolmakers'
Acme Tool Co., 196 Church St., New York 13, N. Y.

KNOBS—Hand
Slewek Tool Div. of Domestic Industries, Inc., 231 S. LaSalle St., Chicago 4, Ill.

KNURLING TOOLS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
Brand Tool & Supply Co., Flower at Washington, Los Angeles 15, Calif.

KNURLS—Steel
Mercury Metal Die & Letter Co., 241 E. 16th St., Los Angeles 15, Calif.

LAPPING COMPOUNDS
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.
Carborundum Co., The, Niagara Falls, N. Y.

LAPPING—Contract
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.

LAPPING MACHINES
Cincinnati Grinders, Inc., Cincinnati, O.
Norton Co., Worcester 6, Mass.
Schraner & Co., A. P., 3838 Payne Ave., Cleveland, O.

LAPPING PLATES (See PLATES—Lapping)

LAPS
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.
Boyar-Schultz Corp., 2112C Walnut St., Chicago 12, Ill.
Chicago Drillet Corp., 919 N. Michigan Ave., Chicago 11, Ill.

LATHE ACCESSORIES
General Die and Stamping Co., 262-272 Mott St., New York 12, N. Y.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHE CENTERS
Kennametals, Inc., 550 Lloyd Ave., Latrobe, Pa.

LATHE CONVERTERS
Master Mfg. Co., The, Dept. TD, Hutchinson, Kansas

LATHE DOGS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

LATHE STOPS
American Products Co., The, 2297 Holden Ave., New York 66, N. Y.

LATHE TOOL CABINETS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

LATHE TOOL POSTS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

LATHE TOOLS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Back-Geared
Logan Engineering Co., Chicago 30, Ill.

LATHES—Ball Bearing
Logan Engineering Co., Chicago 30, Ill.

LATHES—Bench
Logan Engineering Co., Chicago 30, Ill.
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Engine
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Magnetic Polishing
Lima Electric Motor Co., The, 304 Findlay Rd., Lima, O.

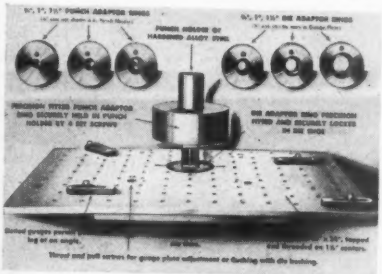
LATHES—Manufacturing
Logan Engineering Co., Chicago 30, Ill.

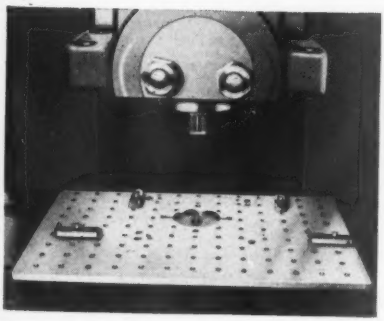
LATHES—Metal Working
Logan Engineering Co., Chicago 30, Ill.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LATHES—Precision
Hardinge Brothers, Inc., Elmira, N. Y.
Logan Engineering Co., Chicago 30, Ill.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.
Springfield Machine Tool Co., The, Dept. TD, Springfield, O.

Whistler Hole Perforator

A single hole perforator for reducing perforating costs, is produced by S. B. Whistler and Sons, Inc., Dept. DJ, 752-756 Military Rd., Buffalo, N. Y., who are well known as producers of punch and die units. The complete Whistler single hole perforating equipment, as illustrated, consists of an alloy steel hardened punch holder, four hardened and ground punch adaptor rings to accommodate punches from $\frac{3}{32}$" to 1½", semi-tempered steel die shoe, gage plate





16" x 24", four hardened and ground die adaptor rings to accommodate die bushings to 1½" and four gauges for positioning the sheet to be perforated. Materials to and including ¼" thick mild steel can be perforated with precision. Punches, dies and strippers, though not included in this set, are also procurable. Complete details, illustrations and parts lists are readily available.

When requesting additional information, please use postage-free Inform-a-gram card on page 146-A.

INFORM-A-GRAM KEY No. 88-Z

BURKE

MILLING MACHINES

No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

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LATHES—Screw Cutting
Logan Engineering Co., Chicago 30, Ill.

LATHES—Speed
Standard Electrical Tool Co., The, Cincinnati 4, O.

LATHES—Toolroom
Hardinge Brothers, Inc., Elmira, N. Y.
Logan Engineering Co., Chicago 30, Ill.

LATHES—Turret
Logan Engineering Co., Chicago 30, Ill.
South Bend Lathe Works, 432 E. Madison St., South Bend 22, Ind.

LAYOUT FLUID
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Dykem Co., The, 2201 No. 11th St., St. Louis, Mo.
Michigan Chrome & Chemical Co., 6350 E. Jefferson Ave., Detroit 7, Mich.

LEADER PINS
Die Supply Co., 4751 Hough Ave., Cleveland, O.

LETTERS & FIGURES—Steel
Mercury Metal Die & Letter Co., 546 E. 16th St., Los Angeles 15, Calif.
New Method Steel Stamps, Inc., 147 Jos. Campau St., Detroit 7, Mich.

LIFTERS
Cullen-Friestedt Co., 1316 So. Kilbourn Ave., Chicago 23, Ill.
Economy Engineering Co., 2659 W. Van Buren St., Chicago 12, Ill.
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.

LIGHTING EQUIPMENT—Industrial
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Vimco Mfg. Co., 117 Chenango St., Buffalo 13, N. Y.

LOCKS—Fixture
Slewek Tool Div. of Domestic Industries, Inc., 231 S. LaSalle St., Chicago 4, Ill.

LUBRICANTS—Gage
Protective Coatings, Inc., Box 56-TD, Detroit 27, Mich.

LUBRICATORS
M-B Products, 130-134 E. Larned St., Detroit 26, Mich.
Madison-Kipp Corp., 212 Waubesa St., Madison 4, Wis.

MACHINE PARTS
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit, Mich.

MACHINERY—Precision
General Engineering & Mfg. Co., Dept. TD, St. Louis 4, Mo.

MACHINERY—Special
Lorain Machine & Tool Co., The, 1951 W. 90th St., Cleveland, O.
Schraner & Co., A. P., 3838 Payne Ave., Cleveland, O.
Triangle Engineering Co., 410 E. 9 Mile Rd., Detroit, Ferndale 20, Mich.

MACHINES—Die Filing
Milwaukee Chaplet & Mfg. Co., 1029 S. 40 St., Milwaukee 4, Wis.

MAGNIFIERS—Headband
Carl Zeiss, Inc., 485 Fifth Ave., New York 17, N. Y.

MANDRELS
Lee Co., K. O., Dept. TD, Aberdeen, S. D.

MANDRELS—Expanding
Lee Co., K. O., Dept. TD, Aberdeen, S. D.
Young Arbor Co., 3257 Bradford Rd., Cleveland Heights 18, O.

MARKING DEVICES
Cunningham Co., M. E., 104 Carson St., Pittsburgh 19, Pa.
Mercury Metal Die & Letter Co., 546 E. 16th St., Los Angeles 15, Calif.

MARKING INKS—Metal
Dykem Co., The, 2201 No. 11th St., St. Louis, Mo.

MARKING MACHINES
Acromark Co., The, 5-15 Morrell St., Elizabeth 4, N. J.
Gottscho, Inc., Adolph, 190C Duane St., New York 13, N. Y.
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

MASTER TYPE—Marking
Preis Engraving Machine Co., H. P., 155-159 Summit St., Newark, N. J.

METAL—Strenes
Advance Foundry Co., The, Dept. TD, Dayton 3, O.

MEASURING INSTRUMENTS—Precision
Ames Co., B. C., Waltham, Mass.

MICROMETERS
Brand Tool & Supply Co., Flower at Washington, Los Angeles 15, Calif.
Lufkin Rule Co., Saginaw, Mich.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
Tubular Micrometer Co., Dept. TD, St. James, Minn.

MICROMETERS—Inside
Tubular Micrometer Co., Dept. TD, St. James, Minn.

MILLING & JIG BORING MACHINES
Linley Bros. Co., 622 State St. Ext., Bridgeport 1, Conn.

MILLING MACHINE ARBORS
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Attachments
Burke Machine Tool Co., 301 E. 16th St., Conneaut, O.
Cincinnati Milling Machine Co., Cincinnati 9, O.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Rusnok Tool Works, 4840 North Ave., Chicago 39, Ill.

MILLING MACHINES—Automatic
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Bench
Ames Co., B. C., Waltham, Mass.
Burke Machine Tool Co., 301 E. 16th St., Conneaut, O.

MILLING MACHINES—Continuous
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

MILLING MACHINES—Dial Type
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Duplex
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Horizontal
Cincinnati Milling Machine Co., Cincinnati 9, O.
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
Kempsmith Machine Co., The, 1829 So. 71st St., Milwaukee 14, Wis.
Lucas & Son, Inc., J. L., Bridgeport, Conn.

MILLING MACHINES—Hydraulic
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Motor Driven
Burke Machine Tool Co., 301 E. 16th St., Conneaut, O.

MILLING MACHINES—Multiple Spindle
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Plain
Kearney & Trecker Products Corp., Milwaukee 14, Wis.

MILLING MACHINES—Plain, Universal
Cincinnati Milling Machine Co., Cincinnati 9, O.
Douglas Machinery Co., Inc., 150 Broadway, New York 7, N. Y.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.

MILLING MACHINES—Precision
Hardinge Brothers, Inc., Elmira, N. Y.
Kempsmith Machine Co., The, 1829 So. 71st St., Milwaukee 14, Wis.
Nichols & Sons, W. H., Dept. TD, Waltham, Mass.

MILLING MACHINES—Production
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Nichols & Sons, W. H., Dept. TD, Waltham, Mass.

MILLING MACHINES—Profile
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Rail Type
Cincinnati Milling Machine Co., Cincinnati 9, O.

MILLING MACHINES—Rotary Head
Kearney & Trecker Products Corp., Milwaukee 14, Wis.

MILLING MACHINES—Vertical
Cincinnati Milling Machine Co., Cincinnati 9, O.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Kearney & Trecker Products Corp., Milwaukee 14, Wis.
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.

MILLS—Hollow
Gairing Tool Co., The, Dept. TD, Detroit 32, Mich.
Genesee Mfg. Co., Inc., Dept. TD, Rochester 4, N. Y.

MOLDING COMPOUNDS
Catalin Corp., 1 Park Ave., New York 16, N. Y.

MOTORS—Electric
Lima Electric Motor Co., The, 804 Findlay Rd., Lima, O.

NAME PLATES—Plastic
Eastern Etching & Mfg. Co., Grape St., Chicopee, Mass.

NIBBLING MACHINES—Metal
National Machine Tool Co., 1536 Clark St., Racine, Wis.

NOTCHING EQUIPMENT
Wales-Strippit Corp., 355 Payne Ave., North Tonawanda, N. Y.

NUMBERING MACHINES
Numberall Stamp & Tool Co., Huguenot Park, Staten Island 12, N. Y.

OIL LUBRICATION SYSTEMS—Automatic
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass.

OILS—Quenching & Tempering
Park Chemical Co., 8074 Military Ave., Detroit, Mich.

OPTICAL COMPARATORS
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.
Trico Products Corp., 40 Trico Sq., Buffalo 3, N. Y.

OPTICAL FLATS
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

OVENS—Industrial
Johnson Gas Appliance Co., 575 East Ave., N.W., Cedar Rapids, Ia.

PANS—Tote
Lucas & Son, Inc., J. L., Dept. TD, Bridgeport, Conn.

PARALLELS—Box, Flat, Solid
Acme Tool Co., 196 Church St., New York 13, N. Y.

PARALLELS—Magnetic
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

PARALLELS—Solid
Challenge Machinery Co., Grand Haven, Conn.

PARALLELS—Toolmakers
Acro Tool & Die Works, 4556 Broadway, Chicago 40, Ill.
Ford Motor Co., Johansson Div., Dearborn, Mich.

PHOTOCOPY EQUIPMENT
American Photocopy Equipment Co., Dept. AA-65, 2849 N. Clark St., Chicago, Ill.

PILOTS
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.

PIPE TOOLS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

PLASTIC EQUIPMENT
Sav-Way Industries, P. O. Box 117, Harper Sta., Detroit 13, Mich.

Rivett Cabinet Lathe

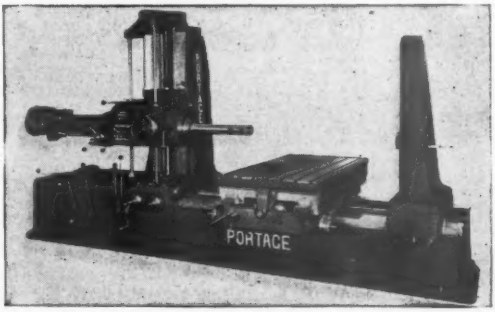
The Rivett No. 918 Plain Cabinet Lathe is produced by Rivett Lathe and Grinder, Inc., Dept. J, Brighton 35, Boston, Mass. This lathe, designed for tool room and light manufacturing, can also handle many jobs that are regularly produced on heavy, costly machines. It has exceptional power, wide speed range, is vibrationless, fast, accurate and trouble-proof in its operation. Setups are easily and quickly made. Operating convenience and long-life precision are incorporated in the 918 Lathe. The ball bearing spindle is mounted in a rugged headstock enclosure supported by a heavy box-section bed. The spindle nose, with long taper-key drive, assures true running and positive drive for chucking attachments. The compound slide rest is automatically squared with centers by a shoe mounting. Selection of speed and direction of the motor and operation of a magnetic controller are accomplished with a convenient control switch. All driving V belts are adjustable and quickly replaceable without disturbing the lathe or drive assembly or removing the spindle from its bearings. The 918 Lathe becomes a multiple operation machine with addition of a six station tilted head turret and double tool cross slide with finely made attachments for slotting, milling, ball turning, grinding and threading.

INFORM-A-GRAM KEY No. 655-Z

PORTAGE

4 INCH BAR HORIZONTAL BORING, DRILLING & MILLING MACHINE

ROTARY TABLES



ACCESSORIES

● Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

THE PORTAGE MACHINE COMPANY

555 Miami Street, Akron 11, Ohio

PLASTIC MOLDING MACHINES—Injection
Lester-Phoenix, Inc., 2625 Church Ave., Cleveland 13, O.

PLATES—Angle
Acme Tool Co., 196 Church St., New York 13, N. Y.
Smith Tool & Engineering Co., 858 No. Sandusky Ave., Bucyrus, O.
Challenge Machinery Co., The, Grand Haven, Mich.

PLATES—Angle Adjustable (Sine Bar)
Nichols-Morris Corp., 44 Church St., New York 7, N. Y.
Robbins Engineering Co., 313 Midland Ave., Detroit 8, Mich.
Triangle Engineering Co., 410 E. 9 Mile Rd., Detroit, Ferndale 20, Mich.

PLATES—Angle, Compound
Angle Computer Co., 5720 Melrose Ave., Los Angeles 38, Calif.

PLATES—Bench
Challenge Machinery Co., The, Grand Haven, Mich.
Delta Mfg. Co., The, 612A E. Vienna Ave., Milwaukee 1, Wis.

PLATES—Cold (See COLD PLATES)

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Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

PLATES—Lapping
Acme Tool Co., 196 Church St., New York 13, N. Y.
Challenge Machinery Co., The, Grand Haven, Mich.
Delta Mfg. Co., The, 612-C E. Vienna Ave., Milwaukee 1, Wis.
Smith Tool & Engineering Co., 858 No. Sandusky Ave., Bucyrus, O.

PLATES—Surface, Glass (See SURFACE PLATES, Glass)

PLUGS—Hollow & Socket Pipe
Die Supply Co., 4751 Hough Ave., Cleveland 3, O.
Holo-Krome Screw Corp., The, Hartford 10, Conn.

POINT THINNER
Oliver Instrument Co., 1436 E. Maumee St., Adrian, Mich.

POINTS
Ford Motor Co., Johansson Div., Dearborn, Mich.
Norton Co., Worcester 6, Mass.

POLISHERS & BUFFERS
Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo 54, Mich.
Production Machine Co., Dept. TJ, Greenfield, Mass.
Sommer & Adams Co., The, 18511 Euclid Ave., Cleveland, O.
Standard Electrical Tool Co., The, Mt. Hope & 6th St., Cincinnati 4, O.

POLISHING GRAINS & POWDERS
Carborundum Co., Niagara Falls, N. Y.
Norton Co., Worcester 6, Mass.

POLISHING WHEELS—Rubber
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.

PRECISION PARTS—Aircraft
Pipe Machinery Co., The, 930 E. 70th St., Cleveland, O.

PRECISION PARTS—Hardened & Ground
Acme Industrial Co., 206 No. Laflin St., Chicago 7, Ill.

PRESSES—Air
Mead Specialties Co., Dept. TD, 4114 No. Knox Ave., Chicago 41, Ill.

PRESSES—Arbor
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.
Wilson, K. R., 215-217 Main St., Buffalo 3, N. Y.

PRESSES—Bench, Punch
Benchmaster Mfg. Co., 2952 W. Pico, Los Angeles 6, Calif.

PRESSES—Broaching
American Broach & Machine Co., Ann Arbor, Mich.

PRESSES—Drill
Baker Bros., Inc., Toledo 10, O.
Delta Mfg. Co., The, 612-C E. Vienna Ave., Milwaukee 1, Wis.
Hamilton Tool Co., The, Ninth & Hanover Sts., Hamilton, O.

PRESSES—Flanging
Cincinnati Shaper Co., The, Hopple, Garrard & Elam Sts., Cincinnati, O.

PRESSES—Hydraulic
Lempco Products, Inc., 5713 Dunham Rd., Bedford, O.

PRESSES—Straightening
American Broach & Machine Co., Ann Arbor, Mich.
Denison Engineering Co., The, 1107 Dublin Rd., Columbus 16, O.

PRESSES—Utility or Shearing
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.

PRODUCTION JOB WORK
Rockford Die & Tool Works, Inc., 1816 17th Ave., Rockford, Ill.

PRODUCTION MACHINE REPAIR PARTS
Enterprise Machine Parts Corp., The, 2735 Jerome Ave., Detroit, Mich.

PROFILERS
Acme Tool Co., 196 Church St., New York 13, N. Y.

PROJECTORS
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

PUMPS—Centrifugal
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUMPS—Circulating
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUMPS—Coolant
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUMPS—Lubricant
Ruthman Machinery Co., The, 1808 Reading Rd., Cincinnati, O.

PUNCHES—Center & Drive Pin
Lufkin Rule Co., Saginaw, Mich.

PUNCHES—Interchangeable
Cincinnati Tool Co., The, 1064 Waverly Ave., Cincinnati 12, O.

PUNCHES—Hand, Toggle Action
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.

PUNCHES—Standard & Interchangeable
Hovis Screwlock Co., 8100 E. 9 Mile Rd., Van Dyke, Mich.
Wales-Strippit Corp., 355 Payne Ave., No. Tonawanda, N. Y.
Whistler & Sons, Inc., S. B. 752-756 Military Rd., Buffalo, N. Y.

PUNCHING ATTACHMENTS
Dreis & Krump Mfg. Co., 7428 S. Loomis Blvd., Chicago 36, Ill.

REAMER DRIVES
Lee Co., K. O., Aberdeen, S. D.

REAMERS
Black Drill Co., 1400 E. 222 St., Cleveland 17, O. (Div. Black Industries)
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Evans Reamer & Machine Co., 526 S. Main St., New Lexington, O.
National Twist Drill & Tool Co., 6522 Brush Ave., Detroit, Mich.
Putnam Tool Co., 2985 Charlevoix Ave., Detroit 7, Mich.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.

REAMERS—Carbide
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

REAMERS—Ground Flute
Lavallee & Ide, Inc., Dept. TD, Chicopee, Mass.

REAMERS—Special
Detroit Reamer & Tool Co., 2830 E. 7 Mile Rd., Detroit 12, Mich.
Lavallee & Ide, Inc., Dept. TD, Chicopee, Mass.
Metal Cutting Tools & Mfg. Co., 11121 Grand River Ave., Detroit 4, Mich.

REAMERS—Straight
Metal Cutting Tools & Mfg. Co., 11121 Grand River Ave., Detroit 4, Mich.

REAMERS—Taper Pin
Lavallee & Ide, Inc., Dept. TD, Chicopee, Mass.

RESINS—Cast
Catalin Corp., 1 Park Ave., New York 16, N. Y.

RETAINERS—Punch & Die
Hovis Screwlock Co., 8100 E. 9 Mile Rd., Van Dyke, Mich.

RIVETING MACHINES
Linley Brothers Co., 662 State St. Extension, Bridgeport 1, Conn.
Tomkins-Johnson Co., The, 630 No. Mechanic St., Jackson, Mich.

ROLLER FEEDS—Automatic
Wittek Mfg. Co., 4305-15 W. 24th Place, Chicago 23, Ill..

RUBBER ABRASIVES—Soft
Roberts Rubber Co., Weldon, (Brightboy Industrial Div.) Newark 7, N. J.

RULES—Steel
Lufkin Rule Co., Saginaw, Mich.

SALTS—Cyanide, Neutral & Hi Speed Steel
Park Chemical Co., 8074 Military Ave., Detroit, Mich.

SANDERS
Walls Sales Corp., 97 Warren St., New York, N. Y.

SAWING MACHINERY
Tannewitz Works, The, Grand Rapids 4, Mich.

SAWING MACHINES—Continuous
Continental Machines, Inc., 1303 So. Washington Ave., Minneapolis 4, Minn.

SAWING MACHINES—Metal
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.
Peerless Machine Co., Dept. TDJ-545, Racine, Wis.

SAWS—Band
Barnes Co., Inc., W. O., Dept. TD, Detroit 14, Mich.
Kalamazoo Tank & Silo Co., Dept. TD, Kalamazoo, Mich.
Tannewitz Works, The, Grand Rapids 4, Mich.

SAWS—Diamond (See DIAMOND SAWS)

SAWS—Foundry
Tannewitz Works, The, Grand Rapids 4, Mich.
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SAWS—General Purpose
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SAWS—Heavy Duty
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SAWS—Hole
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago 39, Ill.

SAWS—Hydraulic
Peerless Machine Co., Dept. TDJ-545, Racine, Wis.

SAWS—Tool & Die Shop
Wells Mfg. Corp., 1940 Ash St., Three Rivers, Mich.

SCALES—Ellipse
Martin Design Studios, 111-B S. Orange St., Glendale 4, Calif.

SCALES—Steel
Lufkin Rule Co., Saginaw, Mich.

SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co., 9339 Woodland Ave., Cleveland, O.

SCREW MACHINES—Hand
Logan Engineering Co., Chicago 39, Ill.

SCREWS—Hexagon Head Cap
Strong, Carlisle & Hammond Co., 1394 W. 3rd St., Cleveland 13, O.

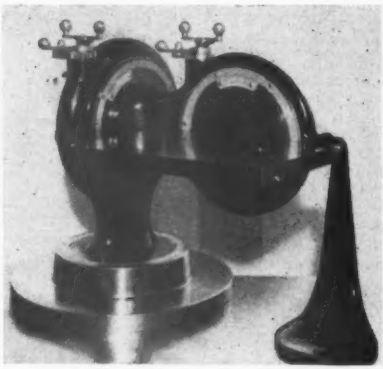
SCREWS—Hollow Set & Shoulder
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Strong, Carlisle & Hammond Co., 1394 W. 3rd St., Cleveland 13, O.

SCREWS—Socket Head
Chicago Screw Co., The, 1026 S. Homan Ave., Chicago 24, Ill.
Danly Machine Specialties, Inc., 2210 So. 52nd Ave., Chicago 50, Ill.
Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 2, Mich.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Standard Pressed Steel Co., Box 630, Jenkintown, Pa.
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland 13, O.

Studler Angle Computer

The Studler Angle Computer, manufactured by the Angle Computer Company, Dept. T, 1709 Standard Ave., Glendale 1, Calif., so simplifies layout of die work, survey of castings and inspection of precision machined parts that it is doing the work in one-half to one-tenth of the time required by other methods. With this instrument, only one set-up is required since the working surface may be rotated 360 degrees in three different planes about three mutually perpendicular axes. By means of the actuating mechanism, the exact desired positions are found, easily and quickly, to .001" or one minute of a degree. Thus, a part having a number of angles and related angles may be surveyed in a few minutes.

There are three protractors incorporated on three axes of rotation: horizontal, vertical and radial. These protractors are graduated in degrees from 0° to 90° in four sections of the circle. The horizontal protractor is equipped with two verniers set at 90° apart, while the vertical and radial



protractors each have one vernier. Verniers are furnished with 5-minute graduations; however 1-minute graduations can be supplied. Graduation lines are square cut, .006" wide and deep, which eliminates fade-out from the effects of surface wear.

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Continental Tool Works, Div. of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich.
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Lufkin Rule Co., Saginaw, Mich.

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Mercury Metal Die & Letter Co., 546 E. 16th St., Los Angeles 15, Calif.
New Method Steel Stamps, Inc., 147 Jos. Campau St., Detroit 7, Mich.
Sossner Tap & Tool Co., 161 Grand St., New York 13, N. Y.

STEEL—Aircraft
Wheelock, Lovejoy & Co., Inc., 138 Sidney St., Cambridge 39, Mass.

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Allegheny Ludlum Steel Corp., Dept. TD-34, Detroit 20, Mich.
Bissett Steel Co., The, 945 E. 67th St., Cleveland 3, O.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Wheelock, Lovejoy & Co., Inc., 138 Sidney St., Cambridge 39, Mass.

STEEL—Alloy, High Nickel
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.

STEEL—Carbon
Bissett Steel Co., The, 945 E. 67th St., Cleveland 3, O.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL—Chromium
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STEEL—"Cobalt"
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.

STEEL—Cold Drawn
Bissett Steel Co., The, 945 E. 67th St., Cleveland 3, O.

STEEL—Composite Die Sections
Allegheny Ludlum Steel Corp., Forging & Casting Div., Dept. TD, Detroit 20, Mich.

STEEL—Die (See STEEL—Tool & Die)

STEEL—Die Casting
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.

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Allegheny Ludlum Steel Corp., Forging & Casting Div., Dept. TD, Detroit 20, Mich.

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Crucible Steel Co. of America, Dept. TD, 405 Lexington Ave., New York 17, N. Y.

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Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.

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Timken Roller Bearing Co., The, Steel & Tube Div., Canton 6, O.

STEEL—Heat Resisting
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.

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Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Firth-Sterling Steel Co., McKeesport, Pa.
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Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL—Mold
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
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STEEL—N.E. Analysis
Bissett Steel Co., The, 945 E. 67th St., Cleveland 3, O.

STEEL—Punch, Chisel & Shock Resisting
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
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STEEL—Special Purpose
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Crucible Steel Co. of America, Dept. TD, 405 Lexington Ave., New York 17, N. Y.

STEEL—Stainless
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N. Y.
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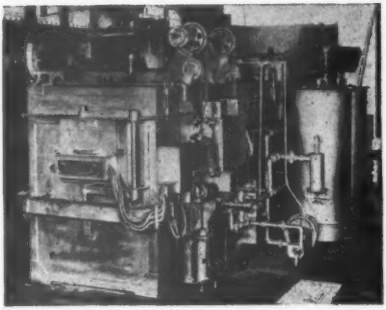
Lakeside Heat Treating



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For additional data and literature, please use postage-free Inform-a-gram card on page 146-A.

INFORM-A-GRAM KEY No. 686-Z

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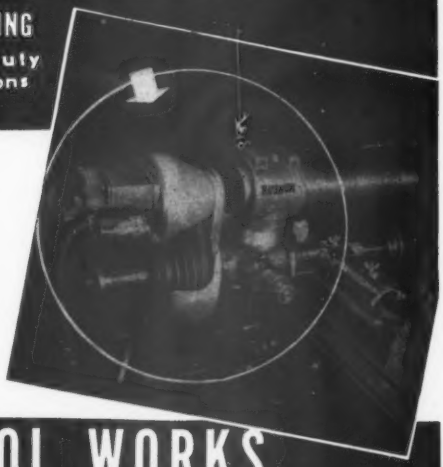

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Carpenter Steel Co., The, Dept. No. 9-L, Reading, Pa.
Cleveland Twist Drill Co., The, 1260 E. 49th St., Cleveland, O.
Crucible Steel Co. of America, 405 Lexington Ave., New York 17, N. Y.
Columbia Tool Steel Co., 410 E. 14th St., Chicago Hts., Ill.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., 138 Sidney St., Cambridge 39, Mass.

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Detroit Die Set Corp., 2895 W. Grand Blvd., Detroit 4, Mich.

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Die Supply Co., 4751 Hough Ave., Cleveland, O.

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Gottscho, Inc., Adolph, 190-C Duane St., New York 13, N. Y.

SURFACE PLATES (See PLATES, Surface)

SURFACE PLATES—Granite
Herman Stone Co., The, Harries Bldg., Dayton 2, O.

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SURFACING MACHINES—Belt Type
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TABLES—Circular
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

TABLES—Elevating, Portable
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.
Hamilton Tool Co., The, Ninth & Hanover Sts., Hamilton, O.

TABLES—Index
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

TABLES—Rotary
Acme Tool Co., 196 Church St., New York 13, N. Y.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.

TABLES—Turn
Challenge Machinery Co., The, Grand Haven, Mich.

TAP EXTRACTORS
Clinton Machine Co., 8240 Harper Ave., Detroit 13, Mich.

TAP GRINDERS
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Die Supply Co., 4751 Hough Ave., Cleveland, O.

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Sosner Tap & Tool Co., 161 Grand St., New York 13, N. Y.

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Black Drill Co., Div. Black Industries, 1400 E. 222nd St., Cleveland 17, O.
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Ill.
Carboloy Co., Inc., 11109 E. 8 Mile Rd., Detroit 32, Mich.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.
Die Supply Co., 4751 Hough Ave., Cleveland, O.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.

TOOL SHANKS
Allegheny Ludlum Steel Corp., Dept. TD, Brackenridge, Pa.
Cooper-Bessemer Corp., The, Dept. J, Mt. Vernon, O.

TOOL STANDS
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TOOL STEEL (See STEEL—Tool & Die)

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Bunell Machine & Tool Co., The, 1601 E. 23rd St., Cleveland 14, O.
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Continental Tool Works, Div. of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 6, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kennametal, Inc., 500 Lloyd Ave., Latrobe, Pa.
Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich.

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TOOLS—Diamond (See DIAMOND TOOLS)

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Firth-Sterling Steel Co., McKeesport, Pa.

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TOOLS—Special Cutting (See CUTTING TOOLS—Special)

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TUBING—Tool Steel
Bissett Steel Co., The, 945 E. 67th St., Cleveland 8, O.

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Carpenter Steel Co., The, Dept. 9-L, Reading, Pa.

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Gottscho, Inc., Adolph, 190-C Duane St., New York 13, N. Y.

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Lufkin Rule Co., Saginaw, Mich.
Scherr Co., Inc., George, 200-B Lafayette St., New York 12, N. Y.

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VISES
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Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Ideal Tool & Die Co., Inc., 735 Congress St., Schenectady, N. Y.
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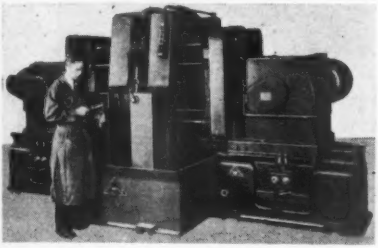

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INFORM-A-GRAM KEY No. 363-Z

★

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Cincinnati Milling Machine Co., Cincinnati 9, O.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Producto Machine Co., The, 990 Housatonic Ave., Bridgeport 1, Conn.

VISES—Pipe
Yost Mfg. Co., 1000 Main St., Meadville, Pa.

VISES—Milling Machine
Acme Tool Co., 196 Church St., New York 13, N. Y.
Gorton Machine Co., George, Dept. TD, 1206 Racine St., Racine, Wis.
Hartford Special Machinery Co., The, 281 Homestead Ave., Hartford, Conn.

VISES—Precision
Vinco Corp., 8873 Schaefer Highway, Detroit 27, Mich.

VISES—Universal
Wesson Products Co., 709 Fisher Bldg., Detroit 2, Mich.

VISES—Woodworkers' & Patternmakers'
Yost Mfg. Co., 1000 Main St., Meadville, Pa.

WASHERS—Lock & Wrought
Die Supply Co., 4751 Hough Ave., Cleveland, O.

WELDERS—Arc
Lee Co., K. O., Dept. TD, Aberdeen, S. D.

WELDING
Danly Machine Specialties, Inc., 2100 So. 52nd Ave., Chicago 50, Ill.

WELDING ELECTRODES
Welding Equipment & Supply Co., 223 Leib St., Detroit 7, Mich.

WELDING PLIERS
Knu-Vise, Inc., 1330 Plum St., Detroit 16, Mich.

WELDING POSITIONERS
Cullen-Friestedt Co., 1316 So. Kilbourn Ave., Chicago 23, Ill.
Lyon-Raymond Corp., 410 Madison St., Greene, N. Y.

WELDING RODS
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland 13, O.

WHEEL DRESSING TOOLS (See TOOLS—Wheel Dressing)

WHEELS—Abrasive
Besly & Co., Charles H., 118-124 No. Clinton St., Chicago 6, Ill.

WHEELS—Cutting Off
Carborundum Co., Niagara Falls, N. Y.

WHEELS—Diamond (See DIAMOND WHEELS)

WHEELS—Mounted
Boyar-Schultz Corp., 2112 Walnut St., Chicago 12, Ill.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill.

WHEELS—Sanding
Sand-O-Flex Corp., 4373 Melrose Ave., Hollywood 27, Calif.

WIRE FORMS & SHAPES
Gibson Co., The, William D., Div. of Associated Spring Corp., 1800 Clybourn Ave., Chicago 14, Ill.

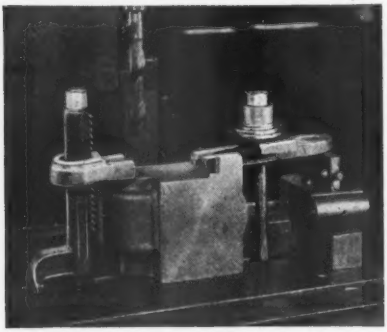
WRENCH SETS
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

WRENCHES
Armstrong Bros. Tool Co., 340 No. Francisco Ave., Chicago 12, Ill.

WRENCHES—Reversible Ratchet
Greene, Tweed & Co., Bronx Blvd., at 238 St., New York 66, N. Y.

★

A name change back to GENERAL DIE AND STAMPING COMPANY has recently been announced by General Die-Stamping-Tool Co. For a long time they were known under that name, but two years ago the "Tool" part, to fix their identity as a tool manufacturer more firmly, was added. It was a good idea, they felt, though a bit too long. So they are returning to the old name and stress the fact that there is no other change anywhere . . . same precision products, same organization.

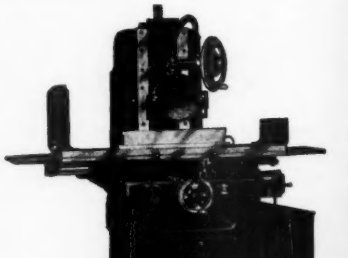


TAKE A LOOK
THIS?——OR——THIS?

Clamping methods for holding work to the machine table have been improved. Howell adjustable high speed work clamps are practical in every sense of the word and needed in every machine shop.

Send for descriptive literature describing these unique clamps.

HOWELL CLAMP COMPANY
1373 East 95th St., Cleveland 6, Ohio



Grand Rapids Surface Grinders are the result of over thirty years actual experience in the building of precision grinding equipment . . . A patented vertical head adjustment is featured. When using the circular Vernier reading for extreme accuracy, the graduated circular plate can be set at zero in relation to the pointer extending inward from the rim of the large hand wheel. The pointer will travel in the same direction as the small inner hand wheel, but at 1/5th the speed . . . Attractive and amply illustrated Bulletin GL-100 is available.

GALLMEYER & LIVINGSTON CO.
304 Straight Ave., SW Grand Rapids 4, Mich.

Newton BAR FEED

Piston Detail

ACCURATE REPEATING

ACCURATE REPEATING of length in bar stock work is assured by the Newton Bar Feed. Rejects are reduced; production stepped up.

Your airline connects to the pressure Regulator which delivers the desired pressure to the far end of the stock tube and actuates the Piston which pushes the stock into the lathe and against the stop under uniform pressure. Thus, length rejections caused by the variations of pressure inherent in mechanical and hand-feeding of stock are eliminated.

Noiseless stock feeding is accomplished by the Newton Bar Feed. The forward end of the Piston, mounted on end-thrust ball-bearings and of inverted cone shape, centers the stock and turns with it, thereby holding it away from the feeder tube.

NEWTON MANUFACTURING CO.

Piston rings of carbon-impregnated Neoprene rubber seldom require renewal in order to retain satisfactory air pressure in the feeder tube. Replacement cost is very low.

Stock loading is facilitated by the Newton Bar Feed. It is only necessary for the operator, without turning away from the lathe, to release the tube lock by a turn of the hand knob, swing the tube over on the slide bracket, insert the bar stock, return the tube to position and lock it.

Pressure regulator in full sight of the operator at all times, is quickly adjusted for various stock weights. Only a small amount of line pressure is necessary for stock feed. For example: 4 lbs. pressure feeds ¼" diameter x 8 ft. stock.

Made in 6 sizes to accommodate bar lengths from 6 ft. to 12 ft., the Newton Bar Feed is priced from

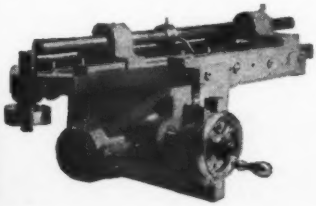
$59.50 to $71.50

Price includes Pressure Regulator, Stands, Piston. Everything is complete, ready for use.

Reeve Taper and Profiling Attachment

For boring tapers and profiling holes this new turret attachment can be set in advance so precisely that the first piece bored will have the taper specified. The size and taper at the face are held the same from piece to piece, regardless of variations in the length of the stock. Only one minute is required to set the device for any required diameter and taper. Either tapered or straight holes may be bored by simply moving back the top slide. Because of the ease of setting and elimination of check-ups during boring, production time is reduced in some cases as much as 50% and rejects are practically eliminated. The attachment can be easily mounted on any hand screw machine or turret lathe without interfering with other tools in the turret. It is also adaptable to some Bullard and chucking machines. Write Artisan Tool & Cutter Co., Dept. T, 531 Vester St., Ferndale 20, Mich.

INFORM-A-GRAM KEY No. E20-Z

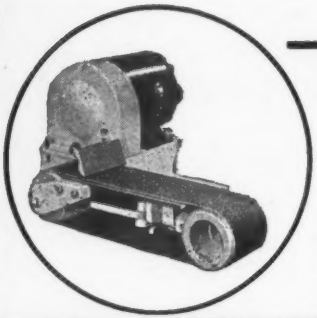


★

DeVilbiss Second Session Spray Painting School

The DeVilbiss Company, Toledo, Ohio, will hold four one-week courses for industrial finishers in the second half of its 1945 School of Spray Painting. Sessions starting July 16th, September 17th, October 15th and December 10th, each covering the same classroom instruction and shop work, will be free to users of DeVilbiss Spray Painting Equipment.

Industrial finishers should write for reservations in any class at least two weeks in advance.



• *HIGH SPEED GRINDING* •

STANDARD D-4 ABRASIVE BAND GRINDER

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit!

Other styles and sizes in New Manual on Finishing — Write Today

WALLS SALES CORP.

97 Warren Street New York 7, N. Y.

ARMSTRONG SETTING-UP TOOLS

This is no time for machines to stand idle, while good tool makers rummage through the scrap heap for setting-up materials or waste valuable time fashioning makeshift setting-up devices. Equip all planers, shapers, milling machines, drill presses and special machines with ARMSTRONG SETTING-UP TOOLS—Planer Jacks, Bracing Jacks, "T"-Slot Bolts and Drop Forged Strap Clamps that reduce setting-up time to a minimum, hold work and jigs rigidly, prevent delays, accidents and spoilage and stand up for years.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

340 N. Francisco Ave., Chicago 12

Eastern Warehouse & Sales: 199 Lafayette St., New York 12

Write for Circulars

Postwar Aluminum

The Aluminum Association, 420 Lexington Ave., New York City, states that peacetime transportation is expected to consume about one third of the total production of the metal. Aviation will undoubtedly continue to be one of the largest users of aluminum as the industry switches over from the production of combat planes to airliners, big cargo transports and family hop-abouts. Predictions for the automobile of tomorrow stress a lighter vehicle as essential to greater economy of operation, and aluminum already is being used extensively in the design of trucks and busses.

Aluminum will assume increasing importance not only in the various modes of travel and cargo shipment, but also in the home, in factory and office, and on the farm, as the developments which were just beginning before the war are resumed.

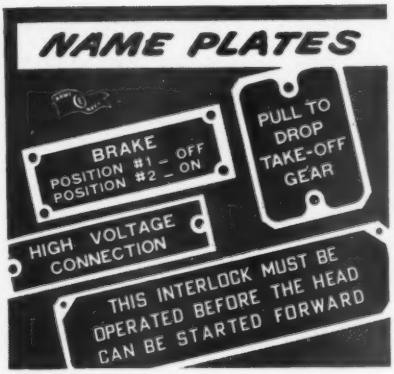
It can now be produced even more cheaply than before the war. Four years ago the price was about 20 cents a pound. Today ingot aluminum is quoted at 15 cents a pound and pig aluminum can be bought for 14 cents a pound.

write for Discounts and Bulletin No. 451

Grobet

TWIN FLUTED COUNTERSINKS

GROBET FILE CO. of AMERICA • 421 CANAL ST NEW YORK CITY


NAME PLATES
BRAKE
POSITION #1 – OFF
POSITION #2 – ON
PULL TO DROP TAKE-OFF GEAR
HIGH VOLTAGE CONNECTION
THIS INTERLOCK MUST BE OPERATED BEFORE THE HEAD CAN BE STARTED FORWARD

Modern Messengers in

ETCHED METAL OR PLASTIC

Name plates, dials, scales, panels. Eastern Etching's prompt deliveries help speed your war production and aid in your reconversion. Normal deliveries — Two Weeks. AAA orders—48 hours. Tool checks, data and instruction plates, dials, scales, instrument panels, etched and lithographed products. ***For complete details write—***

EASTERN ETCHING AND MFG. CO.
CHICOPEE, MASS.

Darwin

PRK - 33
COBALTCROM
Air Hardening, Non-Deforming Cobalt High - Carbon, High Chromium Steel

A tool steel with an original basic formula of our own specifications. Recognized for long die life and unsurpassed quantity production runs.

Outstanding characteristics are simplicity of treatment, uniform hardness penetration to the center, secondary hardness, extremely high tensile strength, resistance to abrasion.

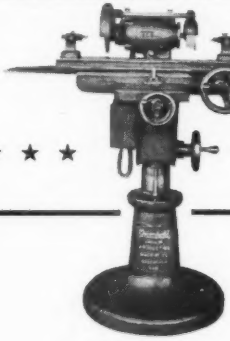
Ideal for blanking, drawing, forming, trimming, and shearing tools.

Furnished in Bar Stock, Billet, Forging, Casting and Welding Rod.

Bulletin on Request

DARWIN & MILNER Inc.
highest grade tool steels
1260 W. FOURTH ST. **CLEVELAND 13, OHIO**

★ ★ ★ ★ ★ ★ ★

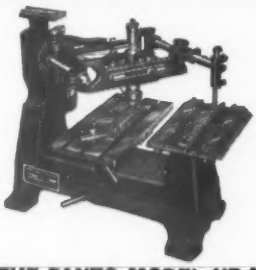


GREENFIELD NO. 3

Versatile Greenfield No. 3 plain Tool and Cutter Grinders are equally at home in the tool room and production shop. The Greenfield No. 3 is capable of handling a great variety of tool sharpening and tool room grinding. Attachments and additional equipment permit sharpening of end mills, counterbores, taps, reamers and drills. Send for detailed job application bulletin.

PRODUCTION MACHINE CO.
Bridgeport 1, Conn.

HEAVY-DUTY BENCH-TYPE ENGRAVING MACHINE

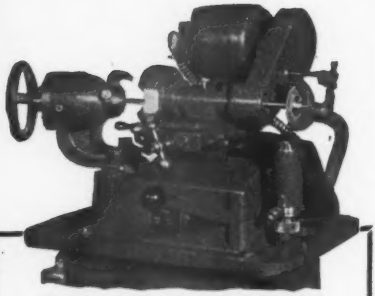


THE PANTO MODEL UE-3
LIGHTER MODELS UE and UE-2

Interchangeable heads for engraving, electrical marking, and acid etching . . . available for all models. Also Panto engraving cutters, cutter grinders, master copy type, endless belts, and accessories.

Write for Catalog

H. P. Preis Engraving Machine Co.
159D Summit Street, Newark 4, New Jersey



HYBCO TAP GRINDERS

Sharpen ALL The Vital Points

CHAMFER • FLUTES • SPIRAL POINT

- *Fast—easy to operate.*
- *Complete—no parts to change.*
- *Capacities—#2 to 1½" hand taps—with interchangeable heads.*

HEADS ONLY AVAILABLE FOR USE ON UNIVERSAL TOOL & CUTTER GRINDERS

Write for Circular TGH

HENRY P. BOGGIS & CO.
1277 W. Third St., Cleveland, O.

MICRONOIL
ELECTRONIZED PRODUCTS

GAGE LUBE

"EACH DROP SAVES A DOLLAR"

WORLD'S MOST SUCCESSFUL WEAR-RESISTANT LUBRICANT FOR PRECISION SURFACES. MAKES FINE GAGES WEAR 3 to 10 TIMES LONGER.

Send for Trial Unit . . . **$5.00**

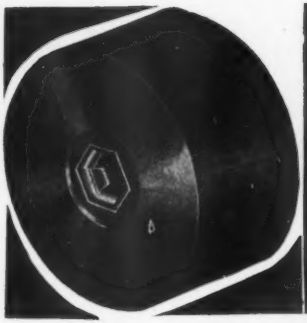
PROTECTIVE COATINGS INCORPORATED
BOX 56-TD • DETROIT 27
"Products of Matchless Merit"

Internal Gear Checker

The S. I. G. Internal Gear Checker, made by National Broach and Machine Co., Dept. J, 5600 St. Jean Ave., Detroit, Mich., will check tooth spacing, eccentricity, pitch diameter and root diameter of spur or helical gears from 3 to 64 diametral pitch and from 2" to 18" pitch diameter. With an auxiliary head, parallelism of spur gear teeth may be checked. To check index, the checking head spindle is advanced to bring the ball point finger in contact with a gear

tooth at pitch line, then the pivot finger is adjusted to contact the adjacent tooth similarly and the indicator is set at zero. The checking head spindle is then retracted by a hand lever while the work gear is indexed one tooth. When the second pair of teeth are contacted, a variation in the dial indicator shows a difference in the tooth spacing. Eccentricity and index can be checked simultaneously. Pitch diameter is checked by comparison with a gear of the known size. Root diameter and eccentricity of the root circle is checked independently by substituting the ball pointed contact finger with a conical point which reaches the gear teeth root.

INFORM-A-GRAM KEY No. A39-Z



HARTLEY

TUNGSTEN CARBIDE

Special DIES *Shaped*

No need to worry about facilities for fast and reliable production of special-shaped dies—that's the specialty of the Hartley Wire Die Company.

Skilled workmen combined with extreme manufacturing care and most critical inspection assure you dies of the high quality you require, and the prompt service you desire.

"From blueprint to finished product"—that's Hartley service. Just send us the prints of the dies you require; no problem is too tough, no job too large or small. Every assistance we can give is yours.

HARTLEY WIRE DIE CO

14 ELM STREET THOMASTON, CONN.

BORSET

EASY-TO-READ DIAL

THE PERFECT BORING HEAD

Borset can be used on any type of machine used for boring holes. Allows immediate changes in boring diameters for successive cuts.

A great time saver, quality built, priced right, immediate delivery from stock.

DEALER inquiries are invited. Excellent protected territory available.

SUPER SALES & ENGINEERING COMPANY

2245 NORTH 48th STREET

MILWAUKEE 8, WIS.

Step Up Your Vision

7, 20 or even 40 TIMES!

With the Highly Efficient Cargille Master Magnifier Set No. 45

Photomicrograph shows effect seen through the 40-power unit. Note scale. Each interval is 0.001" on object viewed.

Once used, these optical tools will be indispensable. For use on surfaces and details not measurable by other means.

Write for Leaflet 45—TD.

R. P. Cargille

118 Liberty Street New York 6, N. Y.

"STAR DUST"

LABORATORY GRADED

PURE DIAMOND POWDERS

STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .0000004 of an inch.

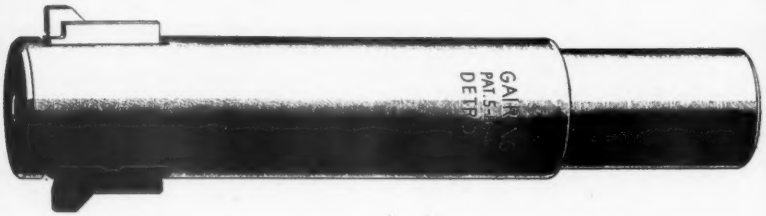
Precision LAPPING POWDERS for PRECISION work

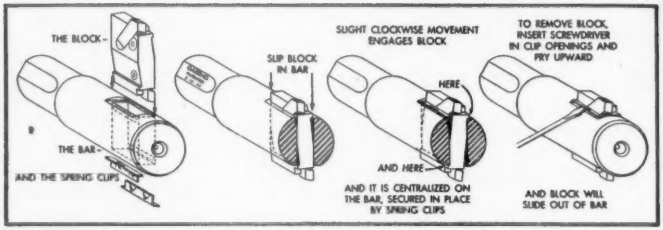
For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- Absolute control of particle sizes
- Complete absence of out-size particles
- STAR DUST sizes as fine as .0001"
- Complete range of grit sizes

There is a STAR DUST Field Servicemen in your territory.

ACE ABRASIVE LABORATORIES ONE SPRUCE STREET NEW YORK 7, N. Y.




THE BLOCK
THE BAR
AND THE SPRING CLIPS
SLIP BLOCK IN BAR
SLIGHT CLOCKWISE MOVEMENT ENGAGES BLOCK
HERE
AND HERE
AND IT IS CENTRALIZED ON THE BAR, SECURED IN PLACE BY SPRING CLIPS
TO REMOVE BLOCK, INSERT SCREWDRIVER IN CLIP OPENINGS AND PRY UPWARD
AND BLOCK WILL SLIDE OUT OF BAR

Gairing Block-Type Boring Tool

This new quick detachable cutter block, recently developed by The Gairing Tool Company, Dept. J, 3105 East Grand Blvd., Detroit 32, Michigan, provides self-centering, positive locking, quick inserting of block in boring bar and easy removal without the aid of locating holes or screws, keys, wedges or taper pins. The block, containing the fully adjustable blades, is simple to manipulate. Made to engage both sides of the precision ground flats on the bar, it quickly and accurately centers itself. When located, the cutting thrust pressure is evenly distributed against the back and bottom of the slot. This new tool combines quick change, positive drive and accuracy. Greater rigidity is assured because the bar is free from centralizing screw holes. Blocks are fitted with high speed steel, cast-alloy or tungsten carbide tipped blades. To insert the block, slip it through the slot in the bar until the projecting lugs engage the ground flats on the bar. It is then perfectly centered. Snap in spring clips which hold the block in place and effectively seal the unit from dirt, chips, etc.
INFORM-A-GRAM KEY No. 800-Z

★

Army-Navy "E" awards were conferred upon Continental Can Company plants 33 and 77, Chicago, for excellence in the production of recoil mechanisms for 155-mm, 240-mm, and eight-inch guns, radar equipment and transmissions for electric trucks.

These Never Get Tired, Sick or Absent

PORTELVATOR (Elevating Table)

A perfect record for attendance and performance and work full time, overtime or double-time. For lifting, "toting," stacking, as bench, for overhanging work, etc.

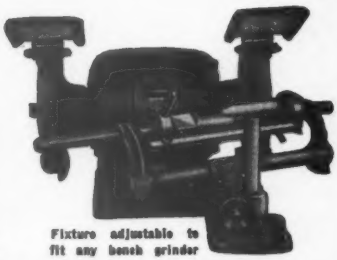
THE HAMILTON TOOL CO.
Ninth and Hanover Streets,
HAMILTON OHIO

Write for Bulletin

MINN-KOTA TAP GRINDING TOOL

With HOLDING Fixture for Bench Grinder

This inexpensive equipment quickly saves its cost. You can regrind old, worn taps repeatedly and make them cut like new again. Grinds any desired chamfer and relief uniformly on all flutes of plug or taper taps, right or left hand. Send for circular.



Fixture adjustable to fit any bench grinder

MINN-KOTA MFG. CO., Dept. 905, FARGO, N. D.

TOOLMAKERS . . .

If you are thinking about your post-war future • If you want a position of permanence

Here is your chance to become associated with a long-established and progressive manufacturing concern, well known in the electrical measuring instrument industry for the quality of its products.

This company has been successful in manufacturing pre-war equipment identical with that now provided in the war effort. We will have a continuing program of post-war toolmaking assuring peace-time security and permanence of employment in a major field.

Modern air-conditioned plant buildings provide pleasant working conditions, and this small Northwestern Ohio College town is an ideal place to live and enjoy life.

THE TRIPLETT ELECTRICAL INSTRUMENT CO.

444 Harmon Road Bluffton, Ohio

Columbia TOOL STEEL

TROUBLE-FREE—
Dependable production is the need of the day.
Good Tool Steel is the answer with its trouble-free, high production performance.
It pays to use Good Tool steel

COLUMBIA TOOL STEEL COMPANY

ARTHUR T. LLABADIE, PRESIDENT
WORKS OFFICE AND WORKS
810 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

Increase Production with

CURVED TOOTH MILLING CUTTERS

Woodruff Keyway . . . Plain Mills . . . Staggered Tooth Side Mills . . . R & L Hand Shear Side Mills . . . Overlapping Side Mills.

Write for Literature

ABER ENGINEERING WORKS, INC., Waterford, Wis.

GAGE HANDLES

STEEL-BLACK-FINISH

PLUG AND TRI-LOCK

Handles will fit gages of standard size. Precision made for accuracy of fit and long life.

These steel handles are economically priced and can be had in any quantity.

Write for Further Details

GREAT LAKES METAL SPECIALTY & MFG. CO.

1448 West North Ave., Chicago 22, Illinois

HY-TEN

AISI NE SAE

Alloy Steels For Victory

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

WHEELOCK, LOVEJOY & CO., INC.

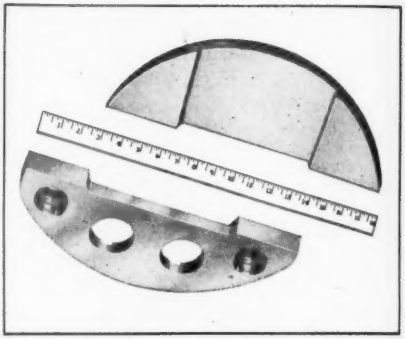
138 Sidney Street

CAMBRIDGE 39, MASS.

Cleveland 14, Chicago 23, Newark 5, Detroit 3, Buffalo 10, Cincinnati 22

Brass Forgings Facilities

Brass forging presses so large that special railroad cars had to be built to transport them to the plant are part of the equipment of the Titan Metal Manufacturing Company of Bellefonte, Pa. With capacities ranging up to 2500 tons, these presses make it possible to turn out forged brass parts weighing as much as 100 lbs. The accompanying illustration, showing a 26 lb brass counterweight forged by Titan, is a good example of the results obtainable in the machining of this free turning alloy.



The desirable physical properties of brass forgings, their good surface conditions, freedom from porosity and the like are, of course, well known.

During 1944, Titan produced approximately 20% of all the brass forgings made in this country, nearly 28,000,000 forgings altogether. While the output of Titan's brass mills is now going almost entirely into war production, the plant has some open capacity for extra heavy brass forgings. Further information may be had direct from the Titan Metal Manufacturing Co., or by use of *INFORM-A-GRAM KEY No. E15-Z*

★

Pipe Machinery Company of Cleveland, Ohio, is proudly flying the Army-Navy E flag with four stars. Manufacturers of gages and small tools, threading machines, automatic taps and dies, this company is one of the first in the Cleveland District to receive this fifth production award.

HAMILTON
SUPER-
SENSITIVE
DRILLING
MACHINE

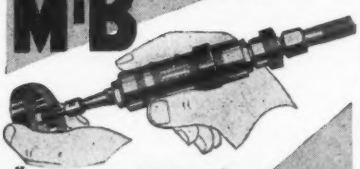
For Particularly Precise Little Holes from .004 to 5/16" dia.

Singly or in gangs, these drills are amazingly accurate—for an infinite variety of precision drilling on panels, intricate instruments, Diesels, airplane and laboratory work.

Send for Bulletins

THE HAMILTON TOOL CO.
Ninth and Hanover Streets,
HAMILTON OHIO

M·B MODEL SS-SR



"SUPER-SPEED" Pneumatic
GRINDER

A 100,000 R.P.M. UNIT

The only hand grinder with spindle speed of 100,000 R.P.M. on 100 pounds air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand. Weighs only 14 oz. *Representatives in Principal Cities.*

Prompt Deliveries on Priority-rated Orders

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130-134 E. LARNED ST.
Detroit 26, Michigan, U.S.A.

Diamond Tool
COST CONTROL

The Koebel Library of Conservation Information is available to help reduce the ultimate cost of your diamonds. Practical employee training literature on how to use diamond tools. Write today for details.

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FIRST TO SET DIAMONDS IN POWDERED METAL

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9444 Grinnell Ave., Detroit

• Hand Power
• Lever Action
for

CUTTERS

Flat Bars
Angles • Rods
Wire Ropes

These cutters have the simplicity of design and sturdiness of construction that are characteristic of Lewthwaite tools. Over fifty years of experience are behind them.

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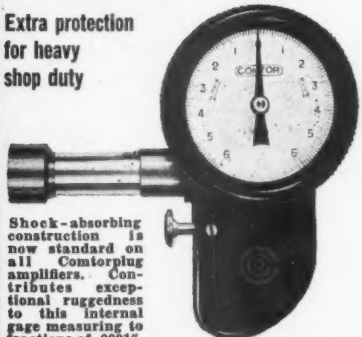
SHOCK-ABSORBING

COMTORPLUG

Extra protection for heavy shop duty



Shock-absorbing construction is now standard on all Comtorplug amplifiers. Contributes exceptional ruggedness to this internal gage measuring to fractions of .0001". Used at machine, inspection bench and by final inspectors. EXISTING PLASTIC AMPLIFIERS CONVERTIBLE TO SHOCK-ABSORBING TYPE.

Request Bulletin 31

The COMTOR Co.

82 Rumford Avenue Waltham, Mass.

"How Carborundum Serves Industry"

Back in 1891, in a little electric furnace made from an iron bowl such as plumbers use for melting solder, the late Dr. Edward Goodrich Acheson created the first man-made abrasive or grinding material. The sparkling, jewel-like crystals he discovered proved to be silicon carbide, to which The Carborundum Company, Niagara Falls, New York, gave the trade name "Carborundum."

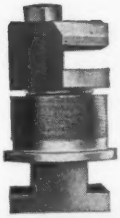
Prior to discovery of this first manufactured abrasive, no one had even dreamed that grinding wheels would ever become important production tools. Previously, they had been mere tool sharpeners. But the creation of the manufactured abrasive opened an entirely new era in industry. How vital a factor it has become in today's unprecedented mass production, especially of interchangeable, duplicate parts, is told most interestingly by means of words and striking pictures in a new 28 page booklet recently received from The Carborundum Company.

In an introduction to this story, which is one of the real romances of American industry, Mr. Arthur Batts, Carborundum president, points out with pardonable pride, how closely the progress of his company has paralleled the remarkable progress made by American industry during the past fifty years. The book reviews the service of abrasives in the war effort and describes how the crystals that came out of a "little iron bowl" became the forerunner of a wide variety of abrasive and refractory products that are certain to contribute importantly to the industrial progress of America in the days of peace to come.

★

In colorful ceremonies held recently at Baltimore, Md., the Army-Navy E award was presented to the Glenn L. Martin Company and its employees for "outstanding performance in producing vital weapons of war for our fighting forces."

Of particular interest was Admiral Ramsey's account of the "Martin Mariner which took to the air from a high sea under a crossfire from enemy guns and brought back to the United States the first photographic record of the invasion of Iwo Jima."



A SOLID NON-CHATTERING CARBIDE TOOL HOLDER

Tool easily removed for grinding without losing set-up

- Eliminates tool chatter
- Easy to adjust for height.
- Simplifies set-up when changing tools.
- Remains solid at all times.
- No blocks or shims required.
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- Standard sizes available.
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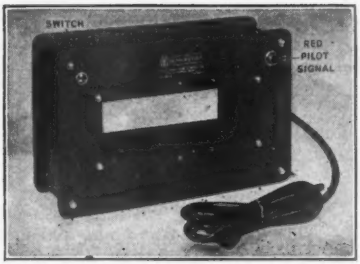
AMC DEMAGNETIZER

A Tool Room Necessity



Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Available for either 115 V. or 220 V.

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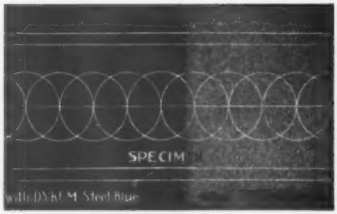

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Simply brush on, ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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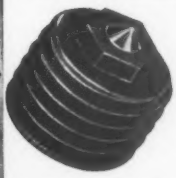
A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3/16″ to 1″ diameters.

Send for price list.

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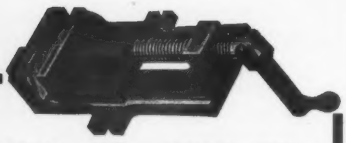

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Offered in two sizes

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3⅛	4	12¾
2D	5	5⅛	23

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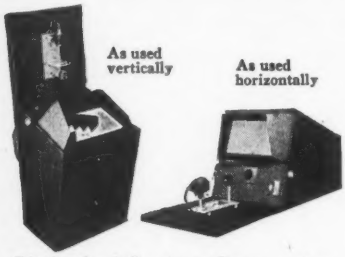

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Checks small parts quickly, accurately

For fast, detailed visual inspection of small intricate shapes such as gauges, dies, gears, parts of instruments, etc., checking height, width, thickness, radius, etc.

Used in either horizontal or vertical position. The Comparator's powerful aspheric condenser system and special lens produce an instantaneous accurate screen projection with a definite magnification of 13x, 25x and 50x. Other magnifications on special order. Convenient; compact.

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Fish-Schurman

Products of Tomorrow Exposition

America's first annual "Products of Tomorrow Exposition" is being planned for an opening on January 18, 1945, subject to military exigencies. Traffic flow and crowd engineers estimate that 35,000 people per day can be handled with the facilities available to the "Products of Tomorrow Exposition."

Chicago has been favored for this exposition because of the accepted fact that even under tight transportation conditions its location and facilities cause the least strain on transportation of any place in the nation. Also the housing facilities already exist. The Chicago Coliseum, the North Hall Exhibition Bldg., The Armory, The Administration Bldg., are all part of the group to be used. Executive offices for the "Products of Tomorrow Exposition" are established at 1513 S. Wabash Ave., Chicago 5, Ill.

There will be few restrictions on the design of displays. Exhibitors will be encouraged to go the limit in originality and effectiveness.

The "Products of Tomorrow Exposition" will comprise two main divisions, consumer and industrial products, with the addition of others as the demand requires. Plans are complete for the use of a million square feet to accommodate everyone with a product to introduce. The exposition will be an annual event to provide a springboard for the introduction of new products and new designs by all industry.

★

Seniority Record Information

Problems of seniority are becoming acute. The return of veterans and reconversion activities, requiring temporary lay-offs or cut-backs of the labor force, confront personnel executives with a need for exact knowledge of seniority in order to deal justly with all employees, as well as to meet the needs of management and the provisions of labor union contracts.

To assist personnel directors in preparing necessary records to handle these problems of seniority, the Systems Division of Remington Rand Inc. has compiled Management Controller No. 709

(TO PAGE 239—PLEASE)

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ON METAL RODS, TUBES, PIPE
for Easy Stockroom Identification
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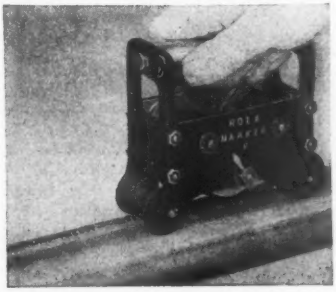

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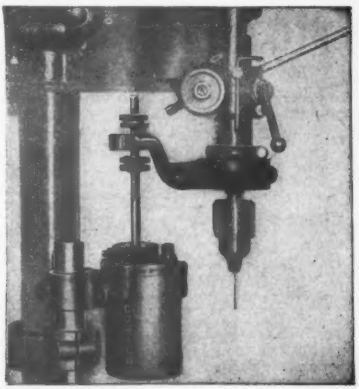

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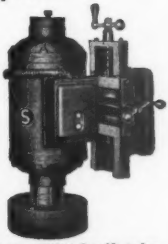

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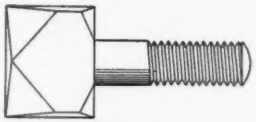

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20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

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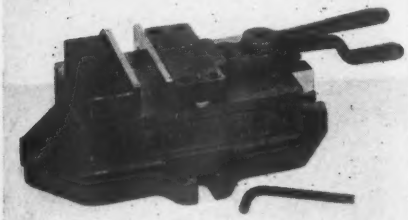
The Problem of Debt Management

There is little likelihood that the national debt will be substantially reduced during the next generation, Simeon E. Leland, chairman of the board of the Federal Reserve Bank of Chicago and chairman of the Department of Economics of the University of Chicago, told members of the Chicago Association of Commerce at a luncheon meeting. "This means," Leland said, "that debt management rather than debt reduction is the important problem before the treasury of the coming years.

"To pay off a debt of $300,000,000,000 in 30 years would require an annual charge of about $13,395,000,000, the effective interest rate being two percent. The annual cost of carrying a $300,000,000,000 debt will require approximately $6,000,000,000 for interest. When the choice is between taxes aggregating $13,400,000,000 for debt retirement and $6,000,000,000 for carrying the debt as it is, most people can be expected to prefer the lower tax bill, especially since



HARTFORD MILLING VISE

The "Four-Point" Milling Vise grips and releases quickly due to the design of the cam-faced and eccentric handles. The eccentric handles provide locking with tremendous binding force. The movable jaw is a single heat-treated steel drop-forging for great strength. The jaws give absolute alignment.

Bulletin No. V-100 gives full specifications.

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postwar business revival has been largely predicated upon a reduction of taxation in order to increase the sums available for expenditure on consumers' goods and services.

"Nor can it be safely assumed that the postwar debt will not exceed $300,000,000,000. The gross debt on May 1 was about $235,000,000,000 and Japan still has to be defeated. How much that will cost and how long it will take are not known today. Likewise, the costs of the war in Europe have not ended with the capitulation of Germany. In World War I the public debt continued to mount for nine months following the cessation of hostilities. The peak of debt for that war came on August 31, 1919 ($26,597,000,000). The costs and liabilities incurred for the second defeat of Germany may be expected on the basis of past experience to run into the next fiscal year. Thus the debt, which has been growing at the rate of about $65,000,000,000 per year, may be expected to continue to increase, but at a declining rate as we now wage a one-front war. And after the war there are

(TO PAGE 238—PLEASE)

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Instructions for mounting Included with Stop. Price $2.00
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Sheet Metal Tool Engineer
With contract or job shop experience, capable of product engineering, process analysis, estimating of product and tool cost, tool, die, jig and fixture designing, and the executive ability to supervise programs with tool shops, production departments and customers. By an old corporation operating a sheet metal parts and assembly division in Western Pennsylvania. Now on war contracts. A-1 post-war connection. Send photo, full resume of education, experiences, references and salary expected to Box NR-6, Tool & Die Journal, 2460 Fairmount Blvd., Cleveland 6, Ohio.

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Easily attached to any standard surface grinder, the JIFFY becomes a part of the machine. Dresses the wheel absolutely true, regardless of relative position of wheel to work table. Dressing is done "with a twist of the wrist" in 5 seconds. All parts hardened, ground and lapped . . . except bracket. Write for Bulletin No. 602 J.

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(CONTINUED FROM PAGE 237)

the postwar expenditure programs to consider. It is doubtful if these activities, particularly the public works programs, will be financed from tax revenues, especially if unemployment is impending. Should a depression intervene, then tax reduction as well as increased expenditures covered by new borrowing may be undertaken. The net result is that debt reduction in the coming years is a remote possibility.

"The skillful handling of the public debt is imperative to the maintenance of our national credit. Interest must be paid faithfully and as promised. Individuals who care to redeem bonds must be paid as the bond contracts have stipulated. At maturity, issues must be refunded and if interest rates decline, conversions must be effected. These operations must be carried on as parts of a consistent fiscal policy, appropriate to the various phases of the economic cycle through which the nation will be passing. Wise debt management thus involves more than the payment of interest or the reduction of principal. It is more comprehensive and more important than either. Debt management is an important tool of fiscal and monetary policy available for use in shaping the national economy."

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★

(CONTINUED FROM PAGE 234)

which is devoted to case histories of the records used by many large and small corporations. A wide variety of records and applications are covered and illustrated by specimen forms and arrangements. The material will be helpful and interesting to companies which have not as yet created adequate seniority records.

Copies of Management Controller No. 709 may be borrowed from any office of Remington Rand Inc., or obtained on a loan basis from the Systems and Methods Research Department, Systems Division, Remington Rand Inc., 465 Washington Street, Buffalo 5, N. Y.

★

The TDJ "Buy With Confidence" directory of products, listing for ready reference the names of manufacturers and dealers, begins on page 201, this issue.

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Because . . .
Mac-it Process makes
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more UNIFORM
more ACCURATE
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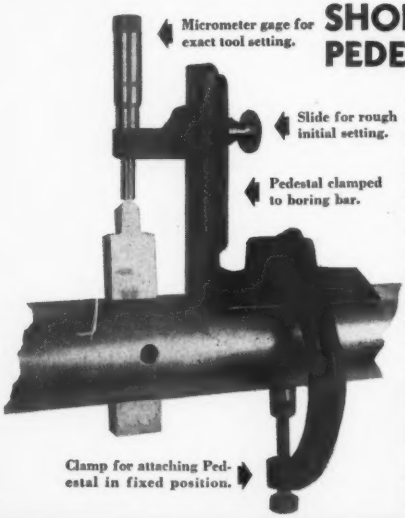
Micrometer gage for exact tool setting.
Slide for rough initial setting.
Pedestal clamped to boring bar.
Clamp for attaching Pedestal in fixed position.

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Model "AM" Bartelt Pedestal Micrometer (shown) is designed for setting tools in boring bars. Conventional cut-and-try method is unnecessary as *tool can be brought to exact position in only one setting.* Speed and accuracy of adjustment reduces set-up time and helps importantly to increase production. Bartelt gages, available in six models, are valuable and practical shop equipment for tool adjusting, work positioning, inspection, checking, and many other gaging operations. *Write for descriptive circulars today.*

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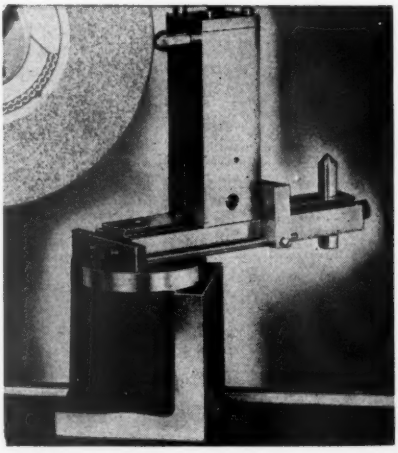

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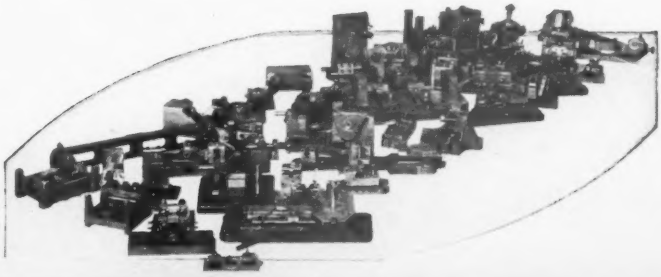

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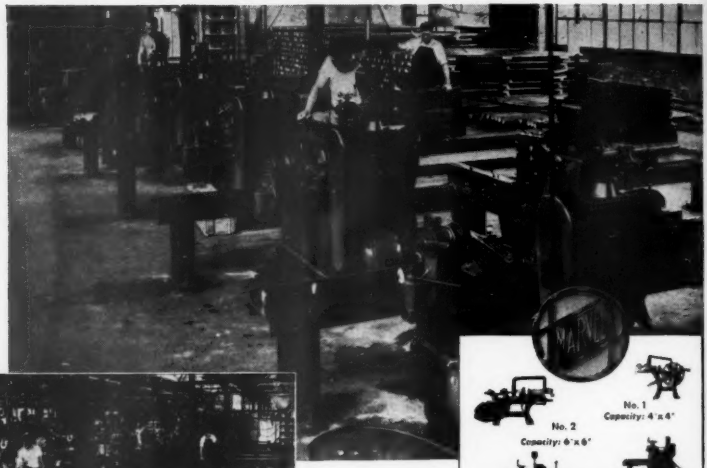

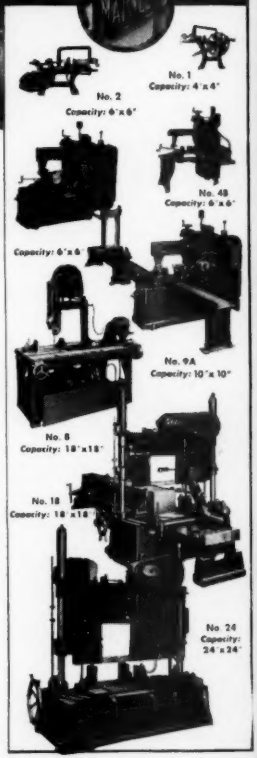

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